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THE THEORY OF PRODUCTION UNDER NONSTATIC CONDITIONS[1]

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WE PROPOSE in the following article to discuss in nonmathematical form some cases of the nonstatic theory of production. The "dynamic" theory of production, in which anticipations are single valued and conditions of production are known perfectly, has been dealt with admirably by J. R. Hicks.[2] The author of the present essay has in another article[3] indicated some results for (1) the case of subjective risk, i.e., where the conditions of production are known perfectly but where there is a probability distribution of the anticipated prices and interest rates. This probability distribution is supposed to be known or definitely anticipated with certainty. If this is not the case, we get (2), an a priori probability of the probability distributions of the anticipated prices and interest rates. This latter case comes under the heading of "subjective uncertainty" and has also been dealt with in the article quoted. The problem of the

[1] The author is greatly indebted to many of his colleagues, especially to Dr. A. G. Hart and Dr. T. W. Schultz and also to Mr. Calvin Stillman for advice and criticism of this paper.

[2] *Value and Capital* (Oxford, 1939), pp. 115 ff.

[3] G. Tintner, "A Contribution to the Nonstatic Theory of Production," in *Studies in Mathematical Economics and Econometrics: In Memory of Henry Schultz* (Chicago, 1942).

influence of past experience upon anticipations has also been discussed there.

We propose in addition to these two cases to deal with the assumption that the technical and technological conditions of production are not definitely known or anticipated with certainty: The technical conditions of production imply the existence of a given state of the arts. The technological conditions involve also technological progress, e.g., new inventions. In this latter case we consider a change of the production functions.

We assume, first, that there is a probability distribution of the technical and technological conditions of production and get the case of (3), technological risk as long as this probability distribution itself is perfectly known. If this should not be the case and we have an a priori probability of the probability distribution of the technical and technological conditions of production, we have (4) the case of technological uncertainty.

FLEXIBILITY AND ADAPTABILITY

The ideas of flexibility and adaptability have been introduced into the theory of production by A. G. Hart[4] and G. Stigler.[5] The idea is simply the following: Assume that the conditions of production are represented not by one but by several production or transformation functions. The amounts of products produced and factors used in the processes of production at an earlier point in time influence the conditions of production at a later point. The individual or firm may have an incentive to arrange earlier production processes in such a fashion as to keep the enterprise flexible and adaptable to future anticipated price and interest contingencies.

DYNAMICS: SINGLE-VALUED ANTICIPATIONS

As mentioned before, this case has been treated very adequately by Hicks,[6] and there is no necessity of repeating his argu-

[4] "Imputation and the Demand for Productive Resources in Disequilibrium," *Explorations in Economics* (New York, 1936), pp. 268 ff.; *Anticipations, Uncertainty, and Dynamic Planning* ("Studies in Business Administration," Vol. XI, No. 1 [Chicago, 1940]), pp. 25 ff.

[5] "Production and Distribution in the Short Run," *Journal of Political Economy*, XLVII (1939), 308 ff.

[6] *Op. cit.*

ments. The question of adaptability and flexibility does not arise, because anticipations are single valued or future prices and interest rates are assumed to be anticipated with certainty. The individual in question will maximize his anticipated discounted net profit by making the ratios between the marginal productivities equal to the ratios of the discounted anticipated prices. Hence this case is really reduced to the static theory of production. Hicks has shown that we can simply treat amounts of the same product or factor at different points in time as different products or factors and then proceed as in the static case.

SUBJECTIVE RISK[7]

We assume with Hicks that the individual is at the point in time zero and plans for the discontinuous points in time 1, 2, ... , n. We can take the problems of flexibility and adaptability into account, and hence we shall get not one but several production or transformation functions. We assume at present that the individual has perfect knowledge of the technical and technological conditions of production.

We have assumed the existence in the individual's mind of a joint probability distribution of the anticipated prices and interest rates. From this probability distribution we can derive the probability of the anticipated discounted net profit to be made over the whole interval 1, 2, ... , n.

Given the probability distribution of the anticipated net profits, we are faced with the following problem: How does the individual or the firm in question evaluate situations of subjective risk? That is, how does he evaluate a given set of anticipated total net profits if they are associated with given probabilities?

In order to deal with this problem in very general terms, we shall assume that there exists a *risk preference functional*, which has to be maximized. It describes the behavior of the individual in question, if faced with such situations. It was assumed in the

[7] Tintner, *op. cit.;* see also F. H. Knight, *Risk, Uncertainty, and Profit* (reprint; London, 1933), pp. 197 ff.; E. Lindahl, *Studies in the Theory of Money and Capital* (New York, 1939), pp. 348 ff.; A. C. Pigou, *The Economics of Welfare* (4th ed.; London, 1932), Appen. A, pp. 771 ff.; J. R. Hicks, "The Theory of Uncertainty and Profit," *Economica*, XI (1931), 170 ff.; "A Suggestion for Simplifying the Theory of Money," *Economica*, II (new ser., 1935), 1 ff., esp. 7 ff.

older literature that this risk preference functional will always be the expected value or the mathematical expectation of anticipated discounted net profits, i.e., the weighted arithmetic mean of discounted net profits with the probabilities as weights. But K. Menger[8] and J. Marschak,[9] among others, have shown that this particular mode of behavior is not unique. The individual in question may easily take other features of the probability distribution of anticipated net profits into account—for instance, its dispersion, its skewness, kurtosis, etc. Using the technique of the modern theory of choice, one could easily construct indifference curves for those several features of the distribution.

A risk preference functional is fixed only if the entire probability distribution of anticipated discounted net profits is known over its whole range. This evidently represents the most general case. The maximization of the mathematical expectation of discounted net profit and other possible modes of behavior are special cases.

Given a specific risk preference functional, the individual will try to maximize it by choosing appropriate amounts of the products anticipated to be produced and of the factors anticipated to be used in production at all points in time over the whole interval. This will determine the plan of the individual in question as it exists at the point in time zero. He may, of course, change his plans at a later date if this seems preferable to him.[10]

SUBJECTIVE UNCERTAINTY

The case of subjective uncertainty is distinguished from the previous case of subjective risk by a new assumption. We assumed up to now that the probability distribution of anticipated future prices and interest rates was definitely known or anticipated with certainty (probability 1). This evidently is a somewhat artificial assumption, and we shall now consider the case in which there is an a priori probability of different forms of the joint probability distribution discussed above.

[8] "Das Unsicherheitsmoment in der Wertlehre," *Zeitschrift für Nationalökonomie*, V (1934), 459 ff.

[9] "Money and the Theory of Assets," *Econometrica*, VI (1938), 311 ff.

[10] A. G. Hart, *Anticipations, Uncertainty, and Dynamic Planning*, pp. 27 ff.

The joint probability distribution of anticipated future prices and interest rates is fixed if, for instance, the means, standard deviations, correlation coefficients, and other moments and characteristics of the probability distribution are definitely known. But, if they are not anticipated with probability 1 and there exists an a priori probability distribution for those characteristics which determine the form of the joint probability distribution of anticipated prices and interest rates in the future, then we have the case of subjective uncertainty.

We assume here that this a priori probability distribution[11] of different forms of the joint probability distribution of anticipated future prices and interest rates is itself definitely known or anticipated with probability 1. If this should not be the case and if the individual is not completely certain in his own mind about the a priori probability distribution, we get a priori probabilities of higher order, which can be dealt with much in the same way as indicated.

Using the joint probability distribution of anticipated future prices and interest rates, together with the a priori probability distribution, we can derive again a probability distribution of anticipated total discounted net profits. The question arises: How will the individual evaluate anticipated sets of discounted net profits if associated with definite probabilities?

In the same manner as before, we simply assume the existence of an *uncertainty preference functional* which expresses the way in which the individual or the firm in question deals with this situation. The simplest assumption again would be that he tries to maximize the mathematical expectation or the weighted arithmetic mean of anticipated total net profits with the probabilities as weights. But there is no reason why we should stop here and not consider more complicated modes of behavior by which the individual or the firm evaluates given probability distributions of anticipated net profits.

The individual or the firm in question will try to maximize his risk preference functional by choosing amounts of the products

[11] J. V. Uspensky, *Introduction to Mathematical Probability* (New York, 1937), pp. 60 ff.

anticipated to be produced or the factors anticipated to be used in future production in such a way as to satisfy his uncertainty preference as best he can. This will determine the amounts of the products anticipated to be produced and the amounts of the factors anticipated to be used at future dates. The individual is able to change his plans at a later date if this seems to be convenient.

TECHNOLOGICAL RISK

We have assumed up to now that there was no doubt in the individual's mind about the technical and technological conditions of production. We now abandon the idea of perfect knowledge of the technical and technological conditions of production. This new problem evidently is a very important case from an economic point of view. Many of the situations of risk and uncertainty which arise in economic life come not so much from anticipated price and interest contingencies as from anticipations of changes in technical and technological conditions. The whole question of technical and technological obsolescence comes into this category.

The technical or technological conditions of production are expressed by certain technical or technological coefficients or parameters which enter into the production or transformation functions. These coefficients determine the form of those functions. We have assumed up to now that they are anticipated with certainty. Let us now consider a situation in which this is no longer the case. There exists a definite probability distribution of the anticipated technical and technological coefficients which fix the form of the transformation functions. Assume for the present, in the case of technological risk, that this probability distribution is itself definitely known or anticipated with certainty.

The distinction between technical and technological risk becomes important if we consider it in connection with subjective risk or uncertainty. There is, for instance, no particular reason to assume that the joint probability distribution of technical parameters and the anticipated prices of the factors of production should show any correlation between the parameters and the prices. We may, on the other hand, anticipate a certain amount of correlation between the technical coefficients and the prices of

the products. A good example for this is agricultural production. The extensive fluctuations in yields can be understood as due to technical risk and uncertainty, even with a given state of the arts. It is highly probable that there is a strong correlation between the technical coefficients expressing the yields and the prices of agricultural products.

But in case of technological risk we will probably have correlations between the parameters of the production functions and the anticipated factor prices. Technological risk assumes a change of the production functions themselves. But if they change, then the anticipated prices of certain factors of production will be likely to rise or to fall, as well as the prices anticipated for the products. Hence, it seems likely that there will be some correlation.

Let us assume that the individual has to make decisions not for the whole period but only for an initial period, say, for the points in time $1, 2, \ldots, n'$ (where n' is smaller than n).

Consider, first, his anticipated behavior in the later period, i.e., for the points in time $n' + 1, n' + 2, \ldots, n$. We can derive in the usual way the most advantageous amounts of the products anticipated to be produced and of the factors anticipated to be used during this latter period. Substituting these, we get the anticipated net profit as a function of the technical and technological coefficients, as well as of the amounts anticipated to be produced and factors anticipated to be used, during the initial period $1, 2, \ldots, n'$, which are still to be determined. But these technological coefficients are random variables according to our assumptions, since they can assume given values with definite probabilities. Hence, the anticipated discounted net profit derived over the whole period $1, 2, \ldots, n$, is itself a random variable, and we can derive its probability distribution.

In this way we get again a probability distribution of anticipated discounted net profits. The question arises: How does the individual behave if faced with technological risk? That is, how does he evaluate sets of anticipated net profits if they are associated with given probabilities?

We can introduce a risk preference functional which shows exactly the way in which the individual in question will evaluate this situation. It shows his behavior if he is faced with probability

distributions of anticipated total net profits. The procedure will be much as before; he will try to maximize his risk preference functional by choosing appropriate amounts of the products anticipated to be produced and of the factors anticipated to be used during the initial period $1, 2, \ldots, n'$. In this way we get again his plan for production during the initial period. He is, of course, free to change this plan and his anticipations at a future date.

TECHNOLOGICAL UNCERTAINTY

We assumed under the heading of technical risk that there is a definitely known probability distribution of the technical and technological coefficients which fix the conditions of production. Assume now that the individual does not know this probability distribution with certainty but that there exists an a priori probability for different forms of the probability distribution.

The joint probability distribution of anticipated technical and technological coefficients is again fixed if its means, standard deviations, correlation coefficients, and other characteristics are given. We assume now that these characteristics are not anticipated definitely with probability 1 but that there is an a priori probability distribution for different values of those parameters.

It may, of course, be the case that this a priori probability distribution, of different forms of the joint probability distribution of the technical and technological coefficients, is not itself definitely known. In this case we would get a priori probabilities of higher order, which can be dealt with much in the same way as before.

We can derive the probability of the anticipated total net discounted profits from the a priori probability distribution of different forms of the joint probability distribution of the anticipated technical and technological coefficients. The question arises: How does the individual behave if he is faced with sets of discounted net profits and their probabilities?

In order to deal with this situation in a very general way we shall introduce an uncertainty preference functional which shows exactly how the individual deals with such a contingency. We shall assume that there is a definite way in which he evaluates sets of anticipated net discounted profits associated with definite probabilities. The individual in question will try to maximize this

uncertainty preference functional, that is, he will satisfy his uncertainty preference as well as he can under the given conditions. This will fix in a manner analogous to the previous case the anticipated amounts of the products to be produced and of the factors to be used in the initial period $1, 2, \ldots, n'$.

EXAMPLES

We want to present in what follows a few constructed examples in order to show some of the outstanding features of the above analysis. They will be illustrated graphically. The use of other than geometric reasoning will be avoided as far as possible. For

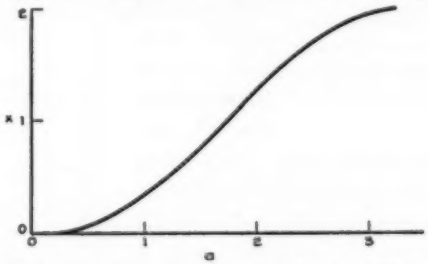

FIG. 1.—Production function. a = factor of production used in the first period; x = product produced in the first period.

an analytical statement of the propositions involved, the author can refer to an article in *Econometrica*.[12]

Dynamics: single-valued anticipations.—We have noted above that the idea of flexibility and adaptability in production implies certain time relationships between the inputs and the outputs. Reducing the complexity of such a problem considerably, we assume that a firm produces one commodity, using one variable factor of production only. We deal with production in two consecutive time periods, say two years. Let a be the amount of the factor of production used in the first period and x the amount of product produced. We show in Figure 1 a graph of the productivity curve, that is to say, for every input of the variable factor, a, in the first year, the amount of the product produced in the first year, x.[13]

[12] G. Tintner, "The Pure Theory of Production under Technological Risk and Uncertainty," *Econometrica*, IX (1941), pp. 305 ff.

[13] $x = 1 - \cos(a - 0.17)$; a is measured in radians.

Assuming a given price for the factor a utilized in the first year, namely, a price of \$5.00 per unit, we show in Figure 2 the total cost curve for varying amounts of the product produced in the first period, x. In Figure 3 we exhibit the average cost curve, that is, the cost per unit for varying amounts of the product in the first period.

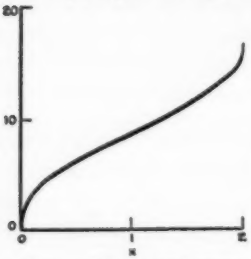

FIG. 2.—Total cost curve. x = product produced in the first period; price of a, factor used in the first period = \$5.00 per unit.

Call b the amount of the variable factor of production used in the second period, say the second year, and y the amount of the product produced in the second year. But assume that there is a peculiar relationship between the amount of the product which can be produced in the second year, y, with a given quantity of the variable factor used during the second year, b. It depends upon the amount of the factor used in the first year, a.

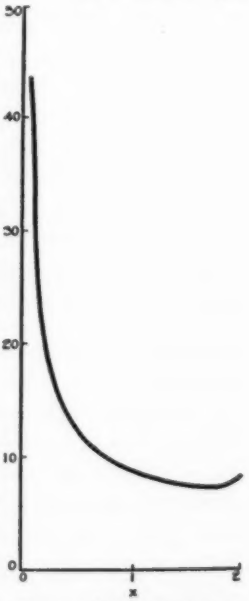

FIG 3.—Average cost curve. x = product produced in the first period; price of the factor used in the first period a = \$5.00 per unit.

We show in Figure 4 a number of productivity curves drawn under this assumption.[14] It is indicated how much of y can be produced by the application of a given quantity b in the second year, if a given amount a was used in the first year. The assumption is that the more of the factor that has been used in the first year, the less is necessary in the second year to produce the same result. This, as my agricultural colleagues tell me, sometimes holds true in agriculture, for instance, with the use of lime on fields.

[14] $y = 1 - \cos(a + b - 3.49)$; a and b are measured in radians.

We show in Figure 5 the total cost curves for the amount of the product produced in the second period, y, assuming the price of the factor of production used in the second period, b, to be

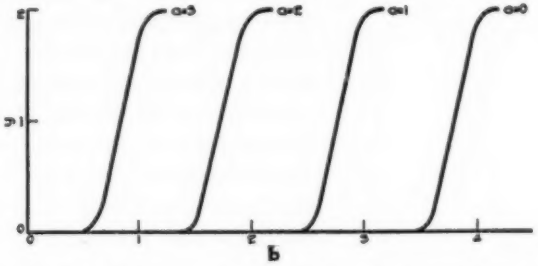

FIG. 4.—Productivity curves. b = factor of production used in the second period; y = product produced in the second period; a = factor of production used in the first period.

equal to $2.00. Strictly speaking, we should deal with discounted prices. But, for simplicity's sake, the rate of interest is neglected for the whole argument. Again we get different cost curves, depending on the amount of the factor which has been utilized in the first period, a. The total costs are higher, the less of this factor has been used in the first period. In Figure 6 we show average cost curves drawn under the same assumption as before; again we see that the average cost for producing a given quantity of the product in the second period, y, is less, the more the factor of production has been used in the first period.

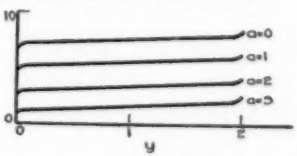

FIG. 5.—Total cost curves. y = product produced in the second period; a = factor of production used in the first period; price of the factor used in the second period b=$2.00 per unit.

Given those data and the anticipated prices of the product and the factor of production in both periods, we can derive the quantities produced and amounts of the factors utilized in both periods in the usual manner. Assuming the anticipated price of the product to be $10.00 in the first period and $2.00 in the second period, the price of the factor of production being $5.00 in the first period and $2.00 in the second period, it appears that the firm in

question will plan to utilize 3 units of the factor in the first period and produce 1.95 units of the product in this period.

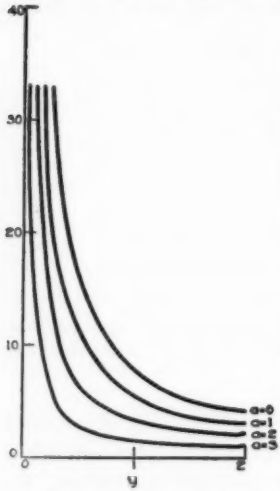

FIG. 6.—Average cost curves. y = product produced in the second period; a = factor of production used in the first period; price of b, factor used in the second period = $2.00 per unit.

Under this assumption we have drawn in Figure 7 a marginal cost curve (solid line) and marginal revenue curve (broken line) for the amount of the product planned to be produced in the second period, y. The profit of the firm will be maximized where marginal revenue is equal to marginal cost, and in our particular case the firm will plan to produce 1.98 units of the product in the second period. In order to do this it has to use 1.07 units of the factor in the second period. The total profit anticipated to be realized under these assumptions will be equal to $12.21.

In a similar manner we can derive the amounts of the product anticipated to be produced and the factor utilized in both periods for varying price constellations of the product and the factor. We show in Figure 8, for instance, the anticipated demand curve for the factor in the second period, b, depending upon the definitely anticipated price of this factor, p. The assumption is again that all the other prices are anticipated as before; that is, the price of the commodity produced is anticipated to be $10.00 in the first period and $2.00 in the second period, the price of the factor $5.00 in the first period and p dollars in the second period. The demand curve is, of course, downward sloping. In a similar manner we can construct the demand curve for the factor in the first period and the supply curves

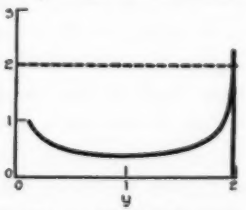

FIG. 7.—Marginal revenue and marginal cost. y = amount of the product produced in the second period; broken line = marginal revenue curve; solid line = marginal cost curve for y.

of the product in both periods, depending upon the anticipated prices.

We have dealt with conditions of flexibility and adaptability of production, i.e., made the assumption that there exist certain time relationships between input and output. We can determine the most advantageous amounts of the products planned to be produced and of the factors anticipated to be used in every period, if the prices of all products and of all factors are anticipated definitely and with certainty (probability 1). This is the case of dynamics. We now proceed to study the problem of economic risk and uncertainty.

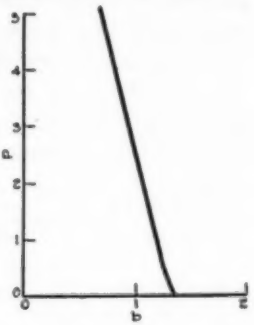

FIG. 8.—Demand curve for b, the factor of production used in the second period. $\dot{p}$ = anticipated price of b; b = factor used in the second period.

Economic risk.—We assumed previously that the technical and technological conditions of production as represented in the production and cost functions and that all the relevant prices of products and factors of production were anticipated with certainty. We shall now introduce economic risk, that is to say, we shall assume that the prices of the factors and the products are not more definitely anticipated prices. For simplicity's sake, we will assume only a probability distribution for the anticipated price of the factor of production in the second period, $\dot{p}$. That is, we still assume that there are single-valued anticipations for the prices of the product in the first and second periods, which are respectively assumed to be anticipated as \$10.00 and \$2.00. We also assume that the individual definitely anticipates the price of the factor of production to be \$5.00 in the first period. We neglect, again, the interest rates.

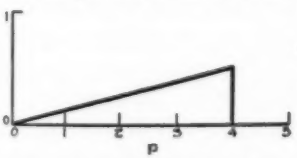

FIG. 9.—Probability distribution of the anticipated price of the factor in the second period; $\dot{p}$ = anticipated price of b, the factor used in the second period.

We show in Figure 9 the probability distribution which, on our

assumption, exists in the individual's mind regarding the anticipated price of the factor in the second period, p. We assume that it is a triangular probability distribution and that the individual anticipates the price of the factor in the second period, p, to be somewhere between zero and $4.00. He thinks a high price more likely than a low price in a fashion indicated in Figure 9.

Let us assume now that the firm has only to make a decision immediately about the amount of the factor anticipated to be used, a, and the commodity to be produced, x, in the first period. If this decision has been made, then the firm will find the appropriate amount of the factor used in the second period and produce the corresponding amount of the commodity in the second period, so as to maximize its profits. The procedure will be much like the one indicated in Figure 7 for the case of single-valued anticipations.

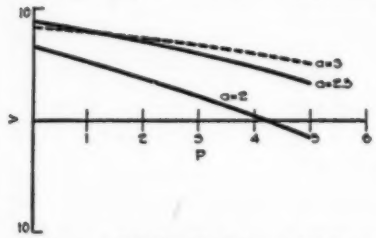

FIG. 10.—Relationship between total anticipated net profit and anticipated price of the factor of production in the second period. V = total anticipated net profit; p = anticipated price of the factor b used in the second period; a = amount of the factor of production used in the first period.

The amount of greatest total net profit (V) will, of course, be different for different anticipated prices of the factor in the second period, p. We show in Figure 10 the functional relationship between the anticipated profit V and the anticipated price of the factor in the second period, p. This relationship will be different, depending upon the amount of the factor utilized in the first period, a. But given the amount of the factor used in the first period, a, the individual or firm will use this amount of the factor in the second period, b, which maximizes the total anticipated net profit. We exhibit in Figure 10 the relationships under the assumption that various amounts of the factor have been utilized in the first period.

It will appear from Figure 10 that the greatest possible net anticipated profit V is a function of p, the anticipated price of the factor in the second period. But we showed in Figure 9 that p is

a random variable. We assumed that the firm in question has a definite probability distribution in mind for different possible values of the price of the factor in the second period. It is easy to see that a function of a random variable is itself a random variable. We show in Figure 11 the probability distribution of the net total anticipated profit V derived from the probability distribution of p in Figure 9, taking into account the functional relationships shown in Figure 10. Again we shall get different probability distributions for different amounts of the factor used in the first period a. Three of these probability distributions of V, corresponding to the cases where 2, 2.5, and 3 units of the factor were utilized in the first period, are shown in Figure 11.

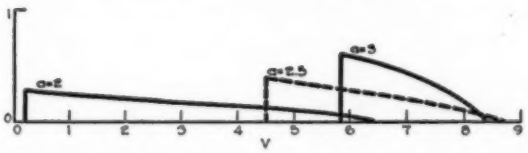

FIG. 11.—Probability distribution of the anticipated net profit. V = anticipated total net profit; a = amount of the factor used in the first period.

We have now to introduce a risk preference functional which is pertinent to the following question: How does the firm in question react if it is faced with different probability distributions of profits, as shown, for instance, in Figure 11? Following suggestions made by Menger and Marschak, we shall not simply assume that the individual or firm acts in such a way as to maximize the mathematical expectation, that is, the weighted arithmetic mean of the distribution of profits shown in Figure 11. Other features of the distribution are also taken into account. We show in Figure 12 a graph of the mathematical expectation, Ex, the standard deviation, σ, and the skewness of the distributions given in Figure 11, β_1. Since it appears that the distributions are different for different amounts of the factor used in the first period, a, all these characteristics are also functions of a.

We assume that the individual takes all those three characteristics of the probability distributions of profit as shown in Figure 11 into account, and we show a risk preference functional φ. This,

in turn, depends upon the anticipated amount of the factor of production used in the first period, a, since the distributions in Figure 11 are different for different a. This risk preference func-

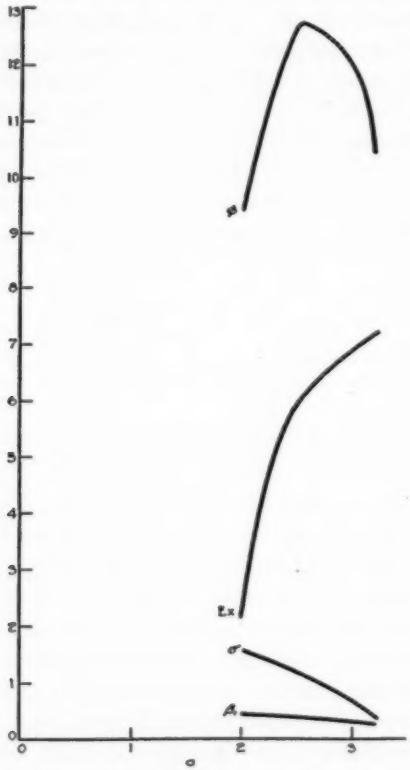

FIG. 12.—Risk preference functional. a = amount of the factor of production used in the first period; Ex = mathematical expectation or arithmetic mean of the probability distribution of V; σ = standard deviation of the probability distribution of V; β_1 = skewness of the probability distribution of V; $\varphi = Ex - \sigma + 2\sigma\beta_1$ (risk preference functional).

tional assumed in the particular case assumes that the individual in question prefers a high mathematical expectation (arithmetic mean), a low standard deviation, and a positive skewness of the distributions of profit given in Figure 11.

The maximum of the risk preference functional fixes the amount of the factor to be used in the first period. From this the amount of the product to be produced can be derived in the usual manner.

FIG. 13.—A priori probability distribution of the range of the probability distribution of p (anticipated price of the factor utilized in the second period b).

Economic uncertainty.—We have assumed up to now that the probability distribution of the anticipated price of the factor of production in the second period shown in Figure 9 was itself known with certainty. The firm or the individual had no doubt at all in his mind about the question of whether this was really the probability distribution of the anticipated price of the factor of production in the second period.

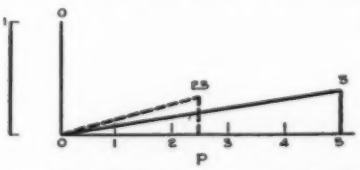

FIG. 14.—Extreme and average probability distribution of p (anticipated price of the factor of production utilized in the second period b). The numbers indicate the range.

Another generalization leads us to consider a somewhat different case. It cannot ordinarily be assumed that the individual is perfectly certain in his mind about the probability distribution of the anticipated prices. Let us say, for instance, in our case that the general nature of the imagined probability distribution of p will be like that in Figure 9. It will be a triangular probability distribution starting at zero, but the individual is not quite certain in his own mind about the range of this distribution. Assume, for instance, that he believes that all ranges of probability distributions, between 0 and 5, are equally probable. We show in Figure 13 the rectangular a priori probability distribution of the range.

In Figure 14 we exhibit the extreme probability distributions corresponding to range 0 and range 5 (solid lines) and also the probability distribution corresponding to the average range 2.5 (broken line). Under these additional assumptions we again get

a set of probability distributions for the largest possible anticipated net profit V, as given in Figure 15.

It is now derived under the assumption that the probability distribution of the anticipated price of the factor in the second period, p, is not known with certainty. There exists on a priori probability distribution. Again, of course, we obtain different distributions depending upon the amount of the factor anticipated to be used in the first period, a.

We show in Figure 16 the mathematical expectation, Ex (arithmetic mean), the standard deviation, σ, and the skewness, β_1, of the probability distributions of profits as given in Figure 15. We

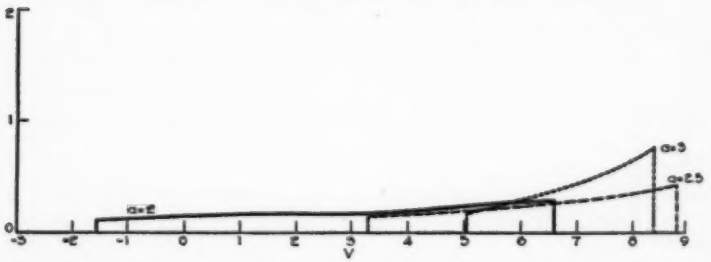

FIG. 15.—Probability distribution of the net anticipated profit. V = total net anticipated profit; a = amount of the factor used in the first period.

introduce a specific uncertainty preference functional, ψ, of much the same nature as the risk preference functional discussed before. It will again depend upon the amount of the factor used in the first period, a, since the distributions are different for different amounts of a. We have indicated in Figure 16 the amount of a, the factor used in the first period, which the individual will plan to utilize in order to satisfy his particular attitude toward the risk situation discussed above. The amount of the product to be produced in the first period can be determined as before.

Technological and technical risk.—We assumed up to now that the technical and technological conditions of production were definitely anticipated with certainty. In the case of technical and technological risk, however, this is no longer true, that is to say that the individual in question is not entirely certain about the

technical and technological conditions of production (production functions) which he thinks will prevail.

To give an example, consider the case which is depicted in Figure 17. We show there a number of productivity curves exhibiting the amount of the production in the second period, y,

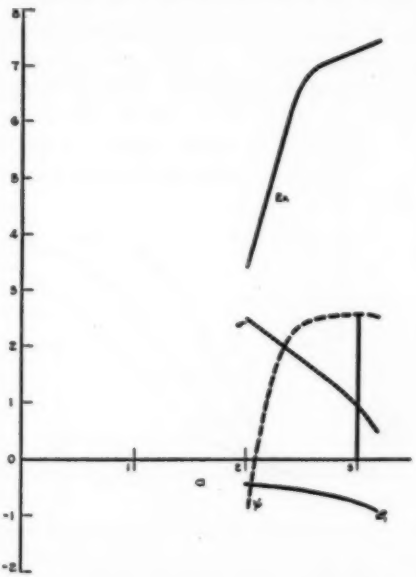

FIG. 16.—Uncertainty preference functional. a = amount of the factor used in the first period; Ex = mathematical expectation or arithmetic mean of the probability distribution of V; σ = standard deviation of the probability distribution of V; β_3 = skewness of the probability distribution of V; $\psi = Ex - \sigma + 5\beta_3$ (uncertainty preference functional).

which is being produced with the application of varying amounts of factor in the second period, b. The assumption is here that two units of the factor have been used in the first period. We assume also that the productivity depends upon a parameter, μ.[15] We show in Figure 17 three productivity curves for μ equal to 0.5, 0.75, and 1.0

[15] $y = 1 - \cos(1/\mu)(a + b - 3.49)$.

If μ is fixed—that is, if the parameter on which the productivity relationship between y and b depends is definitely anticipated with certainty—then our previous analysis holds true. But assume that the individual in question has in his mind only a probability distribution of the parameter μ. We show in Figure 18 that he considers all values of μ between 0.5 and 1.0 as equally likely. Hence, we get in Figure 18 a rectangular probability distribution for the parameter μ which determines the particular shape of the productivity function relating the amount of the

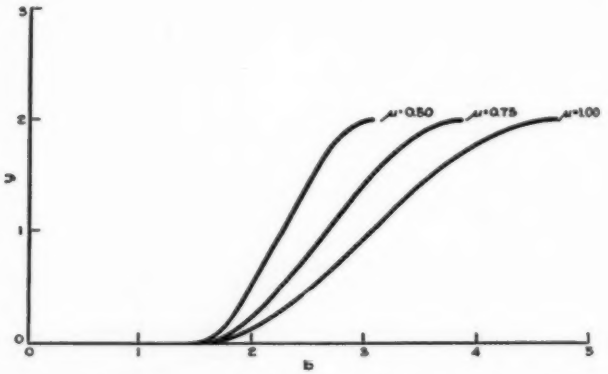

FIG. 17.—Productivity curves for the product in the second period. b = amount of the factor used in the second period; y = amount of the product produced in the second period; μ = parameter of the production function.

factor anticipated to be used in the second period and the product to be produced in the second period. Returning again to Figure 17, we see that the two curves for $\mu = 0.5$ and $\mu = 1.0$ represent the two extreme forms of the productivity curve. The individual is certain in his mind that the productivity curve must lie somewhere in between those two extremes and that all curves in between are equally likely. The curve with $\mu = 0.75$ gives us the productivity curve for the average value of the parameter.

Proceeding much as before, we assume that the individual has to make an immediate decision only about the amount of the factor to be used in the first period, a. Leaving this undetermined

for the time being, there will be for every given a an optimum amount of b (the factor to be used in the second period), which maximizes profits. Hence, the total derived net profit, V, appears as a function of the amount of the factor to be used in the first period, a, and, of course, depend son the parameter, μ, which determines the conditions of production in the second period.

In Figure 19 we show V, the total anticipated net profit, as a function of μ, the parameter which fixes the particular form of the productivity curve or the conditions of production in the second period, as indicated in Figure 17. We get, of course, different functional relationships between the conditions of production as characterized by μ and the total derived net profit, V, depending upon the amount of the factor used in the first period, a, which has still to be decided upon. We show in Figure 19 the functional relationships for $a = 2$, $a = 2.5$, and $a = 3$.

It appears from Figure 19 that the total derived net profit V

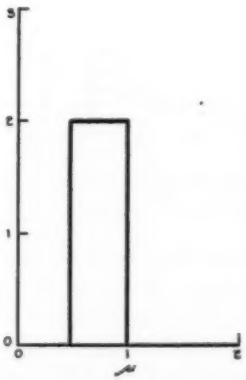

FIG. 18.—Probability distribution of the parameter of the production function. μ = parameter of the production function.

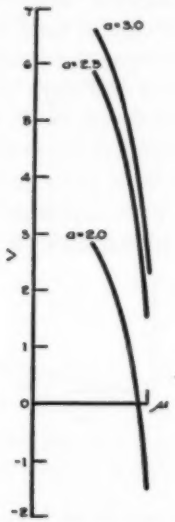

FIG. 19.—Functional relationship between the net anticipated profit and the parameter of the production function. μ = parameter of the production function; V = total net anticipated profit; a = amount of the factor of production utilized in the first period.

is a function of the conditions of production in the second period as characterized by μ. But μ itself is a random variable, as shown in Figure 18, since it can assume all the values between 0.5 and 1.0 with equal probability. A function of a random variable is itself a random variable. Hence we can derive the distributions of the anticipated total net profit, V. These distributions will again depend upon the amount of the factor used in the first period, a. We show in Figure 20 the probability distributions of the total derived net profit, V, for the assumption that 2 units, 2.5 units, and 3 units of the factor of production have been used in the first period ($a = 2$, 2.5, and 3).

We have to postulate a particular mode of behavior for the individual in question if faced with technical and technological risk.

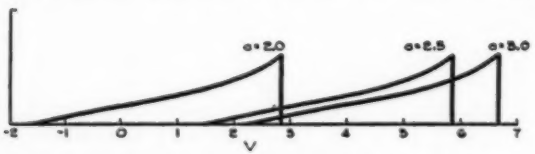

FIG. 20.—Probability distribution of the net anticipated profit. V = net anticipated profit; a = amount of the factor utilized in the first period.

Following Marschak, we shall assume that he is influenced by certain characteristics of the probability distributions shown in Figure 20. We exhibit in Figure 21 the mathematical expectation, Ex (arithmetic mean), the standard deviation, σ, and the skewness, β_1, of the distributions shown in Figure 20. These values, of course, will appear as functions of the amount of the factor used in the first period, a. But the standard deviation and skewness in this case are the same for all values of a.

We introduce a technical and technological risk preference functional, χ, which expresses the fact that the individual in question prefers a great mathematical expectation (arithmetic mean), a small standard deviation, and a large positive skewness of the distributions of profit shown in Figure 20. We have indicated in Figure 21 the amount of the factor which the individual will buy in the first period because it maximizes this particular risk preference functional χ.

If the individual, however, is not certain in his own mind about the probability distribution which fixes the conditions of production but considers again a "probability distribution of probability

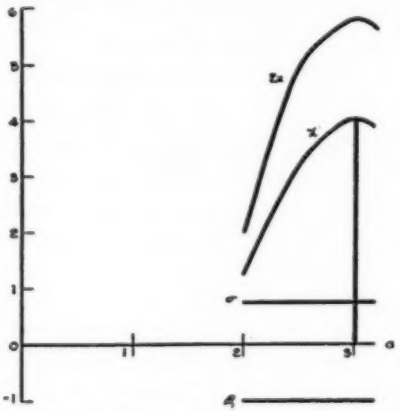

FIG. 21.—Technical and technological risk preference functional. Ex = mathematical expectation or arithmetic mean of the probability distribution of V; σ = standard deviation of the probability distribution of V; β_1 = skewness of the probability distribution of V; $\chi = Ex - \sigma + \beta_1$ (technical and technological risk preference functional).

distributions," then we shall speak of "technical and technological uncertainty." The procedure will be much as indicated above for economic uncertainty, and it does not seem to be necessary to illustrate it in detail.

LARGE-SCALE PRODUCTION IN THE FRENCH PLATE-GLASS INDUSTRY, 1665–1789[1]

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THE Venetian Republic was famous not only for its exquisite crystal but also for its wonderful plate glass (*glaces*) and mirrors. This branch of the industry had begun to flourish there after some unknown artisan in a Lorraine shop had developed the process of making glass mirrors during the opening decades of the fourteenth century.[2] Until around 1600 these two regions competed with each other.[3] The political disturbances which racked northeastern France during the seventeenth century, however, had catastrophic consequences on all branches of the glass industry in Lorraine, and northern Italy was left to monopolize the world-wide market for mirrors and plate glass.

[1] A liberal grant from the University of Chicago in 1936–37 made possible the collection of most of the information which forms the basis of the present article. I am greatly indebted to the officials of the Manufactures des glaces et produits chimiques de Saint-Gobain, Chauny et Cirey, who opened its archives to me and permitted me to carry on freely my research. Unfortunately, most of the manuscripts in these archives were unclassified and grouped in eight *liasses* and two *cartons*. Since there is no way of identifying individual documents, my references are rather vague and unsatisfactory.

[2] Elphège Frémy, *Histoire de la manufacture royale des glaces de France au XVII^e^ et au XVIII^e^ siècle* (Paris, 1909), pp. 1 ff.

[3] That workers in Lorraine shops continued to make and silver plate glass during the century preceding 1600 is attested by J. Beaupré, *Les Gentilshommes verriers, ou recherches sur l'industrie et les privilèges de verriers dans l'ancienne Lorraine aux XV^e^, XVI^e^ et XVII^e^ siècles* (2d ed.; Nancy, 1846), p. 31; Abbé Paul Euvrard, "Contribution à l'histoire de la Champagne. Verreries et verriers dans le département de la Haute-Marne, 1500 à 1830," *Mémoires de la Société des lettres, des sciences, des arts, de l'agriculture et de l'industrie de Saint-Dizier*, XXII (Saint-Dizier, 1933), 14; Dagobert Fischer, "Saint-Quirin, ses verreries," *Mémoires de la Société d'archéologie lorraine et du musée historique lorraine*, 3d ser., IV (Nancy, 1876), 5–6; Henri Lepage, "Recherches sur l'industrie en Lorraine et principalement dans le département de la Meurthe (verreries, papeteries, cartes à jouer, mines)," *Mémoires de la Société des sciences, lettres et arts de Nancy*, XXVI (Nancy, 1850), 46 ff.; Paul Rodier, *Les Verreries des hautes forêts de Darney* (Epinal, 1909), p. 34.

France, along with other European nations, resented this. In good mercantilist fashion she became concerned over the small but continuous leakage of her gold reserves across the Alps. The French ambassador at Venice estimated in 1664 that the mirrors exported to his native land each year amounted to 100,000 *écus* (or 300,000 livres tournois).[4] It is possible, of course, that this was an exaggeration, but France's imports were certainly large enough to worry Colbert, who devoted a lot of his time and energy around 1664 in trying to get the domestic industry started.

There had, indeed, been some attempts to make plate glass in France before this. During the first half of the seventeenth century certain producers had requested and received letters patent from the government which allowed them to make all kinds of glass, including plate;[5] but apparently without exception they never took advantage of their grants. The owners of a few crystal shops in Normandy possessed charters authorizing them to make plate glass, and a few actually produced a little.[6] In addition to these, a Venetian at Saint-Germain, a Lorraine noble at Paris, and a gentleman from Liége at Saint-Antoine (a Parisian suburb) unsuccessfully tried their hand at it in 1665 or earlier.[7] For all intents and purposes, nevertheless, the year 1665 may be considered as marking the beginning of the plate-glass industry in France, for it was at this time that the Royal Plate Glass Company was organized with the help and approval of Louis XIV and Colbert. By 1750 it had grown to be one of the largest privately owned factories in France (and perhaps in the world), and in 1939 it still ranked among the largest producers in its field.

[4] Augustin Cochin, *La Manufacture des glaces de Saint-Gobain de 1665 à 1865* (Paris, 1865), p. 100.

[5] Archives nationales, X^{1a}. *registre* 8650, fols. 455 ff.; Archives départementales de la Haute-Garonne, B. *registre* 1916 (*édits*, 18), fol. 303; Archives de la Compagnie de Saint-Gobain, Viellles archives, *liasse* 1665–1737; Cochin, *op. cit.*, pp. 105 ff.; Frémy, *op. cit.*, pp. 12–13.

[6] Bibliothèque municipale de Rouen, Collection Montbret, MS 1615 (Y. 8), fols. 59 ff.; A. de Girancourt, *Nouvelle étude sur la verrerie de Rouen et la fabrication du cristal à la façon de Venise aux XVI^{e} et XVII^{e} siècles* (Rouen, 1886), pp. 106 ff.; Le Vaillant de la Fieffe, *Les Verreries de la Normandie, les gentilshommes et artistes verriers normands* (Rouen, 1873), pp. 129, 186, 261–62, 280–81.

[7] Frémy, *op. cit.*, pp. 6–7, 24–25.

The history of the plate-glass industry in pre-Revolutionary France is practically identical with the history of this company. As will be demonstrated later,[8] it faced little competition from foreign shops after 1672 or from domestic producers before 1750. From the very beginning it operated on a scale relatively large for that time, and during the eighteenth century it rapidly expanded in size. In no branch of the French glass industry[9] did large-scale, capitalistic production make as much progress as in the production of plate glass. It is my purpose in the present paper, therefore, to describe the growth of the Royal Plate Glass Company from 1665 to the Revolution and to suggest some of the factors which may have conditioned its development.

I

Mainly because of the untiring efforts of Colbert, a handful of Venetian glassmakers were finally brought to France in 1665.[10] In order to persuade them to desert their own hearths, the French minister had to promise them not only high wages but also adequate protection from any attempt on the part of their government to punish them for betraying her trade secrets.[11] In October, 1665, Louis XIV issued the letters patent which authorized Nicolas du Noyer and his associates to silver mirrors and to make plate, optical, crystal, and all other grades of glass for the space of twenty years.[12] With the Venetians' aid a furnace was built at Saint-Antoine on the outskirts of Paris, and the first unblemished mirrors were made there on February 26, 1666.[13]

The location chosen for the shop did not prove to be entirely

[8] See below, pp. 688–93.

[9] There were at least five branches of the industry: (1) windowpanes, (2) bottles, (3) common glassware, (4) crystalware, and (5) plate glass and mirrors.

[10] The private letters of the Venetian ambassador at Paris indicate that eighteen glass-blowers from his country were in the French capital (Cochin, *op. cit.*, p. 19).

[11] The danger which these workers ran was quite real. In January, 1667, two of them died from poison administered by emissary executioners sent out by the Venetian Republic. Most of the others became so frightened that they returned to Italy. By this time, however, Frenchmen had had the opportunity to learn their trade secrets (Frémy, *op. cit.*, pp. 43–47).

[12] Archives nationales, G7. 1687.

[13] Frémy, *op. cit.*, p. 56.

satisfactory. All raw materials, especially wood, were very dear around Paris, and the workers diverted themselves all too frequently in the city.[14] These facts led Colbert to sanction the transfer of Du Noyer's equipment to Tourlaville in Normandy, where another entrepreneur, Richard Lucas de Néhou, was already making a little plate glass.[15] The new furnaces were built either in the last months of 1667 or during the first of the following year,[16] and the buildings at Saint-Antoine were converted into a shop for grinding and polishing the crude glass which was to be sent there from the furnaces in Normandy. The output at Tourlaville was at first so small that the owners decided, on at least three occasions, to import large quantities of plate glass from Venice and to polish and silver it at Saint-Antoine.[17] On June 13, 1670, nevertheless, Colbert could write the French ambassador at Venice that the factory was "well enough established";[18] and about two years later, on September 6, 1672, the king felt that it was time to forbid any of his subjects to import foreign-made mirrors and plate glass under any circumstances.[19]

The company prospered up until 1679.[20] Soon thereafter a slight reorganization became necessary, and the charter was confirmed by a royal order of December 31, 1683, for thirty additional years in the name of Pierre Bagneux.[21] It was not very long, how-

[14] Du Noyer wrote a long letter to Colbert on December 31, 1666, in which he described the disadvantages of having the shop near Paris (Bibliothèque nationale, Mélanges Colbert, MS 142, fols. 277–80).

[15] Eugène Boivin, *Autour de la glacerie de Tourlaville* (Cherbourg, 1929), pp. 77–85, 97 ff.

[16] Archives nationales, G^{7}. 216; Boivin, *op. cit.*, p. 98.

[17] Archives de la Compagnie de Saint-Gobain, Vieilles archives, *liasse* 1665–1737.

[18] Pierre Clément, *Lettres, instructions et mémoires de Colbert* (Paris, 1861–84), II, Part II, 529. See also *ibid.*, pp. 660–61, 672.

[19] Archives de la Compagnie de Saint-Gobain, Vieilles archives, *carton*.

[20] *Ibid.*, *liasse* 1665–1737; Frémy, *op. cit.*, pp. 67–69.

[21] Archives nationales, F^{12}. 640, 1491. Bagneux was merely the fictitious owner. On January 14, 1684, he signed before notary a testimonial that he was only lending his name to Pierre Pecquot, seigneur de Saint-Maurice, and to the other partners (Archives de la Compagnie de Saint-Gobain, Vieilles archives, *liasse* 1665–1737). Thereafter, the company followed this practice of borrowing names for legal purposes.

ever, before a formidable competitor appeared. Several individuals acting through the name of Abraham Thévart obtained exclusive letters patent on December 14, 1688, for another plate-glass factory, which they first built at Saint-Germain-des-Prés near Paris.[22] The furnaces were transferred in July, 1692, to the crumbling castle of Saint-Gobain in Picardy because wood was relatively cheap thereabouts.[23]

The king certainly had not intended to stir up competition when he chartered the new company. He had carefully stipulated that its associates could make and sell plate glass only if their pieces were larger than those blown by Bagneux at Tourlaville and only if they used the casting techniques which they claimed to have perfected.[24] Nonetheless, rivalry did develop. Thévart complained that his company was placed in a disadvantageous position because its large sheets of glass frequently broke while they were being ground and polished; and, since the small pieces could not be sold anywhere in France, the associates had to stand the entire loss. Then, too, an expensive system of mutual investigation and inspection had to be maintained in order to see that neither company violated the monopoly privileges of the other. It was only natural, therefore, that a great deal of friction developed; and Louis XIV finally was forced to order their consolidation on April 19, 1695. At this time he issued a new charter in the name of François Plastrier which prolonged the combined privileges of the two companies for thirty years.[25]

The Royal Plate Glass Company, however, was hopelessly bankrupt in 1702. The owners could not meet their obligations, which totaled at least 1,523,540 livres, and the crown dissolved the partnership by decree of September 16, 1702. It then issued letters patent to another group of entrepreneurs who were acting

[22] Archives de la Compagnie de Saint-Gobain, Vieilles archives, *liasse* 1665–1737; Archives nationales, F[12]. 640, 1491; Bibliothèque nationale, Fonds français, MS 21808, fols. 70–72; Abraham du Pradel, *Le Livre commode des adresses de Paris pour 1692* (Edouard Fournier ed.; Paris, 1878), II, 140–41.

[23] Frémy, *op. cit.*, p. 86; Archives de la Compagnie de Saint-Gobain, Vieilles archives.

[24] Archives nationales, F[12]. 640, 1491.

[25] *Ibid.* The letters patent were issued May 1 of the same year.

under the name of Antoine d'Agincourt.[26] One of the first problems claiming the attention of the new company was what to do with the well-equipped idle factories it found on its hands. The fires in the furnaces at both Tourlaville and Saint-Gobain had probably been extinguished during the latter months of 1700,[27] and the storerooms at Saint-Antoine were cluttered with large stocks of crude and finished glass. The associates finally decided to let the factory at Tourlaville lie idle until 1714 and meantime to concentrate all production at Saint-Gobain.[28] They also adopted such a conservative financial and business policy that their company was able to survive the long depression which plagued most industries during the early years of the eighteenth century. It even endured the severer strain occasioned by rising production costs and fixed selling prices under John Law.[29] After this the company's success was assured. Its monopoly privileges were renewed on February 20, 1727,[30] on October 22, 1757,[31] and again in February, 1785.[32]

[26] Archives nationales, F[12]. 640, 1491; G[7]. 1690; Archives de la Compagnie de Saint-Gobain, *Arrêts, lettres patentes et privilèges pour la Compagnie de Saint-Gobain;* Vieilles archives, *liasse* 1665–1737; Frémy, *op. cit.*, pp. 108–11, 227–28 n. Space does not permit an analysis of the terms under which the new company was formed and the old liquidated.

[27] See, e.g., a letter written by De la Pommeraye (Archives de la Compagnie de Saint-Gobain, *Portefeuille des arrêts et mémoires*).

[28] The fires at Tourlaville were extinguished again three years later, but production there was definitely resumed in 1720 and was continued until the Revolution. During this time Tourlaville made only about one-half as much plate glass as did Saint-Gobain (Archives nationales, G[7]. 219 [8 septembre 1714], 1687; Archives de la Compagnie de Saint-Gobain, *Délibérations*, fols. 41–42 and *Historique de la verrerie*, pp. 100–101; Boivin, *op. cit.*, pp. 159 ff.).

[29] It is interesting to note that people, flushed with Law's paper money, invested in mirrors and that the total sales of the company in 1720 were about two and one-half or three times greater than those in the preceding years (see below, Table 1).

[30] Archives nationales, F[12]. 640.

[31] *Ibid.*, AD[XI]. 53. This renewal was obtained in the face of much public opposition (Archives de la Compagnie de Saint-Gobain, Vieilles archives).

[32] Archives de la Compagnie de Saint-Gobain, *Arrêts, lettres patentes et privilèges pour la Compagnie de Saint-Gobain* and *Historique de la verrerie*, p. 66.

II

Perhaps one reason why the Royal Plate Glass Company had such a difficult time during its formative period was because it expanded its physical plant as rapidly as it did. After its furnaces were transferred to Tourlaville in either 1667 or 1668, the establishment at Saint-Antoine permanently ceased making glass and became the central finishing, storing, and selling plant. The associates decided upon this arrangement because a great deal of glass always broke while it was being shipped from Tourlaville to Paris, their most important market. Shipping only crude glass this distance and then having it ground and polished at Saint-Antoine minimized the loss caused by breakage in transit, because unfinished plate glass was considerably less valuable than that which was ready to sell. Much less fortunate was their decision to open a branch factory at Lessigne near Tonnerre (Yonne). It so happened that the Marquis de Louvois had a lot of wood on his estate which he could not sell, and he used his influence at Louis XIV's court to persuade the Royal Plate Glass Company around 1683 to build a furnace or two on his property. The location proved to be undesirable, and the operations there quite uneconomical; as a result, the production of plate glass at Lessigne was discontinued twelve years later.[33]

A much more important step than this was taken in 1695. Thévart's company with its well-equipped factory at Saint-Gobain merged with Bagneux's and thereby doubled the productive capacity of the Royal Plate Glass Company. The very next year its owners further enlarged their plant by buying up a small crystal and plate-glass shop which had been established at Rougefossé on the barony of Montmirail. Their primary aim in doing this was to ward off any competition in their field. They did continue,

[33] *Historique de la verrerie*, p. 69; Cochin, *op. cit.*, p. 34. The king requested the partners in 1700 to build other furnaces in Alsace near Haguenau in order to ruin foreign shops established on the other side of the Rhine; and, although they were at least seriously considering doing so at one time, they finally persuaded Louis XIV that such a venture would be unwise or even disastrous (Archives nationales, G⁷. 1686; Archives de la Compagnie de Saint-Gobain, *Historique de la verrerie*, p. 71; Frémy, *op. cit.*, p. 102).

however, to make crystalware at Rougefossé until 1702.[34] Thereafter, only the furnaces at Tourlaville and Saint-Gobain were worked, and additional extensions of their physical plant were of the "vertical," rather than of the "horizontal," sort.

In order to provide the furnaces with adequate supplies of basic materials and in order to facilitate the transfer of their output to the polishing plant at Saint-Antoine, several entrepôts and storehouses along the way were found indispensable. Buildings for these purposes had been erected at Chauny on the Oise River before the beginning of the eighteenth century, and storerooms for sand were immediately built on some land bought in 1712 and 1714 at Creil, which was also on the Oise. The empty factory at Lessigne was finally converted into another entrepôt; and similar places were established at La Bellière in Normandy (where the company got its argil), Conflans-Sainte-Honorine (Seine-et-Oise), Rouen, and Cherbourg.[35] The associates even agreed, on November 7, 1729, to buy some property at Alicante in Spain so that they could make their own soda and provide adequate facilities for storing it.[36] Thus, during most of the eighteenth century the Royal Plate Glass Company maintained the extensive factories at Tourlaville and Saint-Gobain; the huge storerooms and polishing plant at Saint-Antoine; the storage-houses and entrepôts at Chauny, Creil, Lessigne, La Bellière, Conflans-Sainte-Honorine, Rouen, and Cherbourg; and some land and buildings at Alicante. It had started out in 1665 with only one furnace!

III

Its output naturally increased as its physical plant expanded, and the owners boasted in 1757 that they were furnishing more than half the world's supply of plate glass.[37] Just how much its actual production increased may be roughly gauged by the total sales figures, which are given in Table 1. It is indeed regrettable

[34] Archives de la Compagnie de Saint-Gobain, *Délibérations*, fols. 26–27; Vieilles archives; Archives nationales, G^{7}. 432 (juillet, août 1703); Cochin, *op. cit.*, p. 34. The Royal Plate Glass Company never made plate glass at Rougefossé.

[35] Archives nationales, T. 14^{1}, *côte* 10.

[36] Archives de la Compagnie de Saint-Gobain, *Délibérations*, fols. 81–82.

[37] Archives nationales, F^{12}. 1490.

that data are wanting for the years before and immediately after 1680. Two separate sources, however, reveal that the annual sales of plate glass shortly before 1695 averaged from 300,000 livres to 350,000 livres.[38] Although a few of the figures in the table are

TABLE 1

ANNUAL SALES OF THE ROYAL PLATE GLASS COMPANY*

(In livres tournois†)

Year	Sales	Year	Sales	Year	Sales
1680.....	212,800	1739.....	1,046,265	1760.....	848,908
1696.....	537,000‡	1740.....	977,403	1761.....	901,010
1697.....	597,538	1741.....	900,965	1762.....	1,073,106
1698.....	991,660	1742.....	736,586	1763.....	1,148,603
1699.....	918,373	1743.....	735,587	1764.....	1,435,927
1700.....	954,218	1744.....	676,729	1765.....	1,495,546
1701.....	718,760	1745.....	774,258	1766.....	1,592,292
1706.....	713,268	1746.....	835,545	1767.....	1,811,211
1717.....	764,660§	1747.....	822,801	1768.....	1,776,457
1718.....	800,990§	1748.....	904,891	1769.....	1,912,209
1719.....	868,460§	1749.....	1,071,975	1770.....	2,116,838
1720.....	1,945,092	1750.....	1,182,099	1771.....	1,903,828
1730.....	798,297	1751.....	1,306,120	1772.....	1,782,148
1731.....	718,919	1752.....	1,297,122	1773.....	1,820,882
1732.....	839,247	1753.....	1,225,752	1774.....	2,220,570
1733.....	753,127	1754.....	1,257,705	1775.....	2,242,266
1734.....	564,629	1755.....	1,379,610	1776.....	2,085,617
1735.....	641,695	1756.....	1,237,724	1777.....	2,165,222
1736.....	836,619	1757.....	1,173,911	1778.....	2,154,262
1737.....	855,760	1758.....	1,048,659	1779.....	1,943,522
1738.....	977,403	1759.....	954,335	1780.....	1,857,172

* Sources: Archives nationales, G7. 1690; Archives de la Compagnie de Saint-Gobain, Vieilles archives, *liasses* and *carton; Portefeuille des arrêts et mémoires;* Frémy, *op. cit.*, pp. 233, 237 (n. 1).

† Henri Hauser (*Recherches et documents sur l'histoire des prix en France de 1500 à 1800* [Paris, 1936], p. 24) has estimated the intrinsic value of the livre tournois in terms of the 1928 franc as being: in 1660, 9.80; in 1676–79, 8.45; in 1690, 8.40; in 1701, 8.00; in 1715, 6.20; in 1720, 2.75; in 1741, 5.00; and after 1774, 5.00.

‡ Estimated from total sales for three-quarters of the year.

§ Least reliable of all; estimated from operating expenses of the year with the aid of several expenses-to-sales ratios.

merely estimates, most of them are for actual sales.[39] And they suggest that from 1680 to 1700 the annual sales of the Royal Plate

[38] *Ibid.*, K. 1198; Archives de la Compagnie de Saint-Gobain, *Portefeuille des arrêts et mémoires.*

[39] I presume that the glass sold the king (see below, p. 696) is included in the total sales for most of the years except 1697, 1698, and 1699. The agents from whose reports the data for these three years were culled did not handle the glass used in royal construction.

Glass Company more than quadrupled, though there was a substantial falling-off in the early years of the eighteenth century.[40] There was another great increase in sales between 1735 and 1775. More than ten times as much glass was sold in 1775 as in 1680, and sales must have been considerably greater in 1680 than in any year from 1665 to 1670.

This increase in the value of annual sales certainly did not exaggerate the increase in the physical volume sold, for the price of plate glass did not rise after 1680 but, in fact, actually declined at least 30 or 40 per cent.[41] A sale amounting to 1,000 livres, consequently, represented a larger and not a smaller amount of plate glass in 1789 than it did in 1680 or earlier. There is the possibility, of course, that its production over short periods of time did not increase as rapidly as the company's income, because much of the glass sold in the later years may have been made much earlier and kept in storerooms.[42] About the only way the output in terms of weight can be measured is by estimating the number of furnaces worked and their capacity.

One furnace used in casting plate glass could produce about 400 or 500 tons of glass a year if 208 chargings were made. It was customary before 1760 to make only 152 chargings, or from 300 to 350 tons. A furnace of this type was built at Saint-Gobain in

[40] Two observations should be made in this connection. First, the Royal Plate Glass Company took over the Saint-Gobain casting factory in 1695; and, second, its associates, perhaps foreseeing the bankruptcy of 1702, may have endeavored to liquidate their stock-on-hand by pushing sales in 1698–1700. At least, they were accused of doing this. The first fact helps to explain the increase in sales following 1695; and the second, if true, would account for the decrease shown by the figures for 1706 and 1717–19.

[41] Copies of the wholesale price schedules drawn up for the Royal Plate Glass Company by the king in 1682, 1694, 1699, 1734, and 1754 are still available (Archives nationales, F[12]. *registre* 67, pp. 101–3; *liasses* 640, 1487, 1491; O[1]. 1990, *côte* 1; Bibliothèque nationale, Fonds français, MS 14115, fols. 36–37; Frémy, *op. cit.*, pp. 127, 196–97, 197 nn.).

[42] The only year for which I have found both sales and production figures suggests this possibility. In 1700 finished glass valued at about 1,165,000 livres was produced, whereas total sales for that year amounted to 954,218 livres (Archives de la Compagnie de Saint-Gobain, *Portefeuille des arrêts et mémoires*). The associates, furthermore, frequently complained before 1720 that their storerooms were filling up with unsold merchandise.

1692, and another sometime before 1725. Only about 180 tons of glass were melted each year in the smaller furnace used in blowing.[43] There were two such furnaces at Saint-Antoine in 1666; by 1725 these two had been moved to Tourlaville and another built there, and two more had been lighted at Saint-Gobain. Still another was constructed at Tourlaville sometime before 1760. All of these furnaces, however, were not worked simultaneously. One used for casting at Saint-Gobain was always lighted while the other underwent repairs, and the same thing was true of the smaller furnaces. My impression, based upon these facts and inferences drawn from other sources,[44] is that the Royal Plate Glass Company could not have made more than 180 tons of glass in any year from 1665 to 1688 and that the volume actually blown, ground, and polished may have been no greater than 100 or 130 tons. Its annual output probably had increased to around 700 tons by 1725 and to 850 tons by the middle of the eighteenth century. Since all of the furnaces were worked more intensively after 1760, it is quite possible that 1,150 or 1,200 tons of plate glass were being produced each year from then until 1789.

IV

The annual sales figures of the Royal Plate Glass Company and my estimates as to its physical output suggest that the company had considerably expanded its scale of operations during the century preceding the Revolution. This suggestion is supported by additional information. Soon after the company was formed in 1665, its factory personnel included about 200 individuals.[45] At least 450 skilled, semiskilled, and unskilled workers were employed in or around its various shops in 1700; between 900 and

[43] Each pot contained approximately 500 or 600 pounds of glass; each furnace held six pots; and 100 chargings could be made each year.

[44] Archives de la Compagnie de Saint-Gobain, *Historique de la verrerie*, pp. 167 ff., 178–79, 337, 341, 345, 389, 403 ff., 581; Vieilles archives, *liasses* and *carton; Organisation de Saint-Gobain en 1769, (III) administration; Portefeuille des arrêts et mémoires;* Archives nationales, G^{7}. 1690; O^{1}. 1992A, *côtes* 2 and 4; T. 14^{1}, *côte* 10; Bibliothèque nationale, Mélanges Colbert, MS 142, fol. 277; Jacques Savary des Bruslons, *Dictionnaire universel de commerce* (Paris, 1723), II, 234.

[45] Bibliothèque nationale, Mélanges Colbert, MS 142, fol. 277.

1,000 in the decade 1741–50; and probably as many as 1,200 or 1,400 in 1775.[46] All of these, of course, were not full-time employees. At the branch factory of Saint-Gobain in 1769 there were 101 regular employees working around the furnaces, 11 administrators or officials, and 123 day laborers who cut and hauled wood or performed sundry tasks about the factory.

The company's growth may also be roughly gauged by the increase in the value of its assets. Capitalized at 60,000 livres tournois in 1665, its assets were valued at more than 12,500,000 livres

TABLE 2

VALUE OF THE ASSETS OF THE ROYAL PLATE GLASS COMPANY*

(In livres tournois)

Year	Value of Assets	Year	Value of Assets
1666	180,000	1700	2,200,000†
1674	435,686	May, 1702	3,966,409
1675	464,361†	November, 1702	3,134,655
1676	426,347†	1775	11,836,733
1680	547,081	1776	12,054,207
1695	894,200† 1,099,630†	1777	12,467,740
		1778	12,571,018
1697	1,200,000	1779	12,456,466

* Sources: Archives nationales, E. *registre* 1911 (9 mars 1700); F^{12}. 1490; G^{7}. 1690; Archives de la Compagnie de Saint-Gobain, Vieilles archives, *liasses* and *cartons; Historique de la verrerie*, pp. 126 ff.; *Portefeuille des arrêts et mémoires;* Bibliothèque nationale, Mélanges Colbert, MS 142, fol. 277; Frémy, *op. cit.*, pp. 57–58, 60, 103, 218 ff. Some of the figures in this table should be considered only as rough estimates, for even the primary sources were not always in accord.

† Either I have made slight corrections in these figures or there is considerable uncertainty as to their accuracy.

in 1778. Table 2 presents their value at various other dates when data are available. It must be borne in mind, however, that the

[46] These figures are based on numerous but conflicting estimates found in various manuscripts and on reliable but incomplete data from account records found in the company's private archives in Paris. The specific references are: Archives nationales, F^{12}. 1490, 1491; G^{7}. 219 (8 septembre 1714), 1690; T. 14^{2}, *côte* 10; Archives départementales du Calvados, C. 2975; Archives de la Compagnie de Saint-Gobain, Vieilles archives, *liasses* and *cartons; Délibérations*, fol. 47; *Etat des officiers et commis, 1774–1792; Organisation de Saint-Gobain en 1769: (I) fabrication, (II) ouvriers, (III) administration;* Bibliothèque nationale, Collection Moreau, MS 1384, fols. 240, 249; Germain Brice, *Nouvelle description de la ville de Paris, et de tout ce qu'elle contient de plus remarquable* (Paris, 1725), II, 244; Frémy, *op. cit.*, pp. 59, 105; A. Voisin, "L'Industrie verrière aux environs de Cherbourg," *Bulletin de la Société artistique et industrielle de Cherbourg*, XVIII (Cherbourg, 1895), 46–47.

livre declined in value during the eighteenth century and that these figures have to be adjusted if they are to limn the actual increase in the company's assets. According to some crude index numbers which I have made from the price material for Paris and Château-Gontier found in Professor Henri Hauser's book,[47] the purchasing power of the livre fell by about 50 per cent from 1661–70 to 1771–80. This would indicate that the Royal Plate Glass Company possessed about fourteen times as much valuable property in 1775–79 as it did in 1674–75, a decade after it was first organized.[48]

Its size may be better appreciated if it is compared with other French glass factories and enterprises in other industries. In 1775 the assets of the Royal Plate Glass Company probably equaled in value the combined assets of twenty-five or thirty of the largest factories making bottles, windowpanes, or white glassware, and each of these twenty-five or thirty factories was engaged in large-scale, capitalistic production.[49] In all other industries, apparently, only the coal-mining company of Anzin was larger. Around 1790 it employed up to 4,000 workpeople and 600 horses, had assets worth approximately 23,000,000 livres, received a gross annual income of about 3,500,000 livres, and made over 1,000,000 livres net profit.[50] The Le Creusot munitions works, the largest

[47] *Op. cit.*, pp. 107–57, 208–44. It is indeed regrettable that more satisfactory material of this sort has not yet been made available.

[48] The difference in the figures for 1695 or 1697 and the figure for 1680 is explained by the fact that the plate-glass factory at Saint-Gobain merged with the Royal Plate Glass Company in 1695.

[49] Warren C. Scoville, "Technology and the French Glass Industry, 1640–1740," *Journal of Economic History*, I (1941), 164 ff.; "State Policy and the French Glass Industry, 1640–1789," *Quarterly Journal of Economics*, LVI (1942), 431.

[50] Marcel Rouff, *Les Mines de charbon en France au XVIII^e siècle, 1744–1791* (Paris, 1922), pp. 247 ff., 333, 350. The extraordinary dividends paid out by the Anzin company from 1764 to 1784 averaged 481,000 livres a year, and one of its ownership shares brought 399,000 livres on the market in 1781 (*ibid.*, p. 248). By comparison, the annual extraordinary dividends of the Royal Plate Glass Company from 1765 through 1776 amounted to almost 419,000 livres, and one of its shares sold for 480,000 livres in 1780. Thus, the glass company made a much higher rate of return on capital invested than the coal-mining company because its assets were worth only about one-half as much as the assets of Anzin. This was doubtless due to the glass company's being much more monopolistic than the Anzin.

of its kind in Europe, in 1787 was considerably smaller. Only 7,000,000 livres had been spent in building its forges, hammers, and foundries at Le Creusot and Indret (near Nantes) and its Cristallerie de la reine at Montcenis, and its output for 1787 had an estimated value of 1,200,000 livres.[51] The Royal Plate Glass Company, therefore, was probably the second largest manufacturing or mining enterprise in France; and, if the sums which it had invested could have been liquidated without loss and used to employ unskilled labor at the current wage rate, between 15,000,000 and 25,000,000 people could have been put to work for one day!

V

Much of the increase in the company's assets represented reinvestment of earnings. Unfortunately, I have not been able to ascertain just how much capital was supplied by the associates during the seventeenth century, but I have found no indication whatsoever that they were called upon for further advances after 1720. Immediately before this, during the dark days of the Regency and John Law's activities, they were required to pay back 336,000 livres which had been distributed to them in 1713 and to accept large dividends in practically worthless banknotes. During the latter half of the eighteenth century their earnings became so large that the associates hesitated to pay them out as dividends and formally adopted the policy of plowing back as much of their profits as possible.[52] They decided upon this expedient because they feared that an already hostile public would demand the abrogation of their monopoly privileges if it ever discovered just how profitable their position was proving.

That the Royal Plate Glass Company proved extremely profitable to its owners is scarcely open to question. Table 3 presents

[51] Hubert and Georges Bourgin, *L'Industrie sidérurgique en France au début de la Révolution* (Paris, 1920), pp. 411 ff. Of course, Le Creusot had been begun only six years earlier and had not yet had time to expand fully. It should be noted, however, that Le Creusot belonged in a somewhat different category than either Anzin or the Royal Plate Glass Company, for Louis XVI held 333 of its 4,000 shares (*ibid.*, p. 415). I am indebted to Professor John U. Nef for the references to Anzin and Le Creusot.

[52] Archives de la Compagnie de Saint-Gobain, *Délibérations*, fols. 133, 166.

the annual "extraordinary" dividends paid out during the years for which estimates or more reliable data have been found. These dividends do *not* include (1) the annual interest on the capital advanced, which was fixed at 10 per cent in 1702 and later raised to 17 per cent, (2) the New Year gifts paid each associate from the treasury, or (3) the 1,000 livres per share paid each year as *droits de présence fixe*.[53] The company had been capitalized at 1,100,000 livres when it was reorganized in 1695 and at 2,040,000

TABLE 3

EXTRAORDINARY DIVIDENDS OF THE ROYAL PLATE GLASS COMPANY*

(In livres tournois)

Year	Dividends	Year	Dividends	Year	Dividends
1695	22,000	1718	306,000§	1767	408,000
1696	152,247	1719	86,400	1768	408,000
1697	367,997	1720	1,115,000§	1769	408,000
1698	357,633	1750	102,000	1770	408,000
1699	320,307†	1751	204,000	1771	255,000
1700	29,955	1752	204,000	1772	255,000
1701	6,744	1753	204,000	1773	357,000
1702	23,873	1754	408,000	1774	408,000
1703	156,000	1755	408,000	1775	612,000‖
1704	108,000	1764	100,800	1776	690,000‖
1713	336,000‡	1765	408,000		
1717	350,930§	1766	408,000		

* Sources: Archives de la Compagnie de Saint-Gobain, Vieilles archives, *liasses* and *cartons; Délibrations*, fols. 19, 28, 127; *Portefeuille des arrêts et mémoires*.

† Sixty-six thousand livres of this was in plate glass.

‡ Returned to the treasury in 1717.

§ In banknotes.

‖ Approximately.

livres when a new group of associates took it over in 1702. Even if the assumption is made that all of this was paid in, the extraordinary dividends in most years[54] would still amount to something like 10, 20, or 30 per cent. The small dividends in 1700, 1701, and 1702 reflected the straitened circumstances which finally forced the company into bankruptcy during the latter part of 1702, and the exceedingly large dividends declared in 1720 were an outgrowth of John Law's regime. The sales of plate glass

[53] Frémy, *op. cit.*, pp. 236–37.

[54] It should be clear that omissions in Table 3 merely mean that I was unable to find figures for all the years—not that there were no extraordinary dividends paid in those years which are missing.

soared in 1720[55] because of the fact that its selling price remained fixed[56] while people's money income increased rapidly. The company's treasury, consequently, bulged with depreciating bank-notes, and the associates decided that the only way they could stave off complete ruin was to distribute the money among themselves before it lost all value.

The company's success, quite naturally, was reflected not only in the dividends distributed to its owners but also in the increase

TABLE 4

MARKET VALUE OF ONE OWNERSHIP SHARE IN THE ROYAL PLATE GLASS COMPANY*

(In livres tournois)

Year	Value	Year	Value
1702	85,000	1757	132,000
1711	85,000		135,000
1712	85,000	1761	160,000
1713	80,000	1769	200,000
	83,333	1773	324,000
1732	85,000	1778	420,000
1733	85,000	1780	480,000
1750	88,888	1788	444,000
1752	91,435		466,000

* Sources: Archives nationales, T. 14[1], *cote* 10; Archives de la Compagnie de Saint-Gobain, Vieilles archives, *liasses* and *cartons; Délibérations*, fols. 36–37, 117, 119 ff., 121 ff., 129 ff., 186; *Portefeuille des arrêts et mémoires;* Cochin, *op. cit.*, pp. 154–61.

in the value of its shares. When Du Noyer first organized the Royal Plate Glass Company in 1665, one of its twenty shares was nominally worth 3,000 livres. By 1670 its value had risen to 10,000 livres, and five years later the owners agreed that the widow of any one among them should receive 16,000 livres per share in return for her interest.[57] When the company was reorganized in 1695 after Saint-Gobain and Tourlaville were com-

[55] See above, Table 1.

[56] On April 11, 1720, the king allowed the company to raise its selling prices by one-third until October 1 of the same year, but the price level in Paris had almost doubled since 1716–17 (Earl J. Hamilton, "Prices and Wages at Paris under John Law's System," *Quarterly Journal of Economics*, LI [1936], 51).

[57] Archives de la Compagnie de Saint-Gobain, Vieilles archives, *liasse* 1665–1737; Frémy, *op. cit.*, pp. 218, 219 (n. 2).

bined, each of the twenty-two shares had a par value of 50,000 livres. Their market value had risen to at least 90,000 livres by 1699; and, if a disgruntled, ousted partner may be believed, it actually reached a peak of 120,000 livres before 1702.[58] The data in Table 4 represent the approximate market value[59] of one share at various times after D'Agincourt took over in 1702. Each of the twenty-four shares in the new company was given a par value of 85,000 livres in 1702, and their market value was no more than this as late as 1733. By 1761, however, their value had almost doubled; twelve years later it had almost quadrupled; and still later, in 1780, it had not quite sextupled. Their market value at this time was one hundred and sixty times greater than their nominal value in 1665!

VI

Production on a large scale, however, is not necessarily the same as capitalistic production. This is true if the workers are not hired in a free labor market and do not work together in factories or shops owned by others than themselves, if some motive other than the desire to make profits guides the decisions of the entrepreneurs, or if the fixed and/or operating capital is supplied by the king or some government body out of the public revenue. Before the conclusion can be drawn that the Royal Plate Glass Company was a truly capitalistic enterprise, these considerations must be taken into account.

The cleavage between employer and employee was quite distinct. From the very beginning, in 1665, workers were hired in a free market, and none of the associates worked at the furnaces. All of the employees—save woodcutters and draymen—worked, and many of them lived, on the company's property. I have found no evidence which would support the belief of one writer[60] that the majority worked in their own homes. At the end of the seven-

[58] Frémy, *op. cit.*, pp. 222–23; Archives de la Compagnie de Saint-Gobain, Vieilles archives, *liasse* 1665–1737.

[59] I have tried to ignore the nominal value given shares when they were transferred among relatives or others solely for purposes of management.

[60] Iosif Kulischer, "La grande industrie aux XVII[e] et XVIII[e] siècles: France, Allemagne, Russie," *Annales d'histoire économique et sociale*, III (Paris, 1931), 28.

teenth century, it seems, a little plate glass was, in fact, ground and polished by the inmates of the old soldiers' hospital and by beggars confined at Bicêtre, Essonne, and Saint-Denis. This was certainly exceptional, and the amount of glass finished in this manner was negligible.[61] Up until 1697 French and Italian glass-blowers of noble lineage (the picturesque *gentilshommes verriers*) were employed both at Saint-Gobain and at Tourlaville, but in this year the owners of the Royal Plate Glass Company decided to transfer them all to Tourlaville and to hire only plebeian workers in the future.[62] The gentlemen glassmakers were said to demand too much compensation and to be too independent in their conduct and work. Thus it happened that the break with the privileged *gentilshommes verriers* first developed in the plate-glass industry.[63]

This action suggests that the owners of the Royal Plate Glass Company were hardheaded businessmen, intent on making as much profit from their investment as possible. Among them, in 1695, were to be found two Parisian merchants, a royal councilor, a secretary to the king, two receivers-general of finances, a comptroller-general of the salt tax (*gabelle*), an assistant to Pontchartrain, and a commissioner-general of the French galleys. Four wealthy Parisian bankers became members after the bankruptcy and reorganization proceedings in 1702.[64] On April 17, 1703, they adopted an elaborate system of bookkeeping and asked the treasurer to submit each week a concise statement of the receipts and expenditures and to balance all books at the end of each month.[65]

[61] Archives de la Compagnie de Saint-Gobain, Vieilles archives.

[62] Archives nationales, G^{7}. 216; Archives de la Compagnie de Saint-Gobain, Vieilles archives, *Historique de la verrerie*, pp. 35, 44; Boivin, *op. cit.*, p. 155; Cochin, *op. cit.*, p. 91; Frémy, *op. cit.*, pp. 188, 189 (n. 1).

[63] Later, owners of furnaces making dark bottles or Bohemian window glass also began to hire plebeians.

[64] Frémy, *op. cit.*, pp. 160–61, 164.

[65] Archives de la Compagnie de Saint-Gobain, *Délibérations*, fols. 10–11. It should not be assumed, however, that the treasurer and his assistants were always accurate and faithful in performing their duties. Bookkeeping errors were common, and one which has come to my attention is worth noting. At the end of 1772 the books showed cash assets amounting to 1,852,176*l.* 8*d.* even though there was 2,875,034*l.* 13*s.* 6*d.* in cash actually in the treasury. The owners had to step in and work over the records for several hours before they could locate the error.

A comprehensive system of accounting was essential to the financial success of the Royal Plate Glass Company because it was so large and because it had so many owners. Professor W. R. Scott has suggested that the facility with which shares of ownership could be bought or sold distinguished joint-stock companies from large partnerships.[66] If this distinction is accepted, it must be concluded that the associates in the company, varying in number from four in 1671 and thirteen in 1702 to thirty in 1773,[67] were joined together in a partnership. They were not allowed to sell their shares without the consent of the others, who always retained an option on any share offered for sale. If an outsider purchased the share, he could have no voice in the management of the business unless he was expressly given this right by the other owners. It was agreed that the partnership was not to be dissolved upon the death of any one of its members. Instead, the shares were to revert to the deceased's inheritors, who could either sell them back to the company or select some one acceptable person to represent their interests in the affairs of the business.[68]

Neither the king as a private individual nor the French government participated in the Royal Plate Glass Company. It was entirely privately owned and operated. Its title simply meant that the business was organized as a "royal manufactory," with the rights and privileges which this entailed.[69] Louis XIV and Col-

[66] *The Constitution and Finance of English, Scottish and British Joint-Stock Companies to 1720*, I (Cambridge, 1912), 442.

[67] Archives de la Compagnie de Saint-Gobain, Vieilles archives, *liasses* and *cartons;* Archives nationales, F^{12}. 1490; G^{7}. 1690; T. 161^{17}; V^{7}. 340; Frémy, *op. cit.*, pp. 118, 160–61.

[68] I have examined four of the partnership contracts (for 1667, 1684, 1695, and 1703) drawn up for the management of this company.

[69] See my article on "State Policy and the French Glass Industry, 1640–1789," *op. cit.*, p. 433. The king exacted a *quid pro quo*. The Royal Plate Glass Company had to sell him all the mirrors and plate glass he needed at prices which were from 10 to 50 per cent lower than the maximum wholesale prices (Archives nationales, F^{12}. 640, 1491; O^{1}. 1990, *côte* 1; Bibliothèque nationale, Fonds français, MS 14115, fols. 32–35). Furthermore, he did not pay his bills promptly and in 1781 owed the company 223,288 livres (Archives de la Compagnie de Saint-Gobain, Vieilles archives). D'Agincourt and his associates were told by Louis XIV to pay Marshall de Noailles 50,000 livres in return for their letters patent issued in 1702 and to accept a court favorite as one of the partners. Again, in 1757, the associates had to scatter 150,000 livres in court circles before they could get their privileges renewed (*ibid.*).

bert, however, did take an active part in getting the company started. In 1665 they sent to Venice for artisans skilled in blowing plate glass and met all of the expenses, which amounted to about 8,000 livres, involved in the trip. They then tried to keep the Venetians in France by visiting the factory and distributing more than 4,000 livres as bonuses among the workers, by according them the privileges of French citizens, and by sending for their wives and families. In addition to all this, Louis XIV in 1665 loaned the company 37,000 livres without interest.[70]

VII

Not only did the king and Colbert assist in the organization of the Royal Plate Glass Company, but they also did their utmost to assure its success. Foreign competition initially was a great problem; therefore, Colbert ordered one of his agents at Venice on November 15, 1669, to ascertain which French merchants were still buying Venetian mirrors.[71] Just what he did with the list of names, I do not know. He probably reprimanded the merchants and then proceeded to circumscribe their activities. Some Venetian mirrors bought at the Frankfort Fair were seized in 1671 on the technical charge that the shipment had not entered France by way of the prescribed route from Italy to Lyons,[72] and a royal order issued in September of the following year prohibited outright all importation of foreign-made mirrors and plate glass.[73] As was to be expected, this order in itself was not very effective. Eighteen cases of Venetian glass were seized at Marseille in Sep-

[70] Archives nationales, F[12]. 640, 1491; G[7]. 1687; Frémy, *op. cit.*, pp. 38–41; Jules Guiffrey, *Comptes des bâtiments du roi sous le règne de Louis XIV*, I (Paris, 1881), cols. 96, 98, 103, 149, 150, 152, 156, 280, 286. This loan was certainly not repaid before 1683 (Archives de la Compagnie de Saint-Gobain, Vieilles archives, *liasse* 1665–1737).

[71] Cochin, *op. cit.*, pp. 100–101. Colbert received the list in March, 1670 (G.-B. Depping, *Correspondance administrative sous le règne de Louis XIV*, III [Paris, 1852], 516–17).

[72] A royal order issued July 20, 1671, confirmed the seizure (Archives communales de Lyon, AA. *registre* 10, fols. 167–79).

[73] Archives nationales, T. 14[1], *côte* 10; Archives départementales des Bouches-du-Rhône, B. *registre* 121, fol. 206; Archives de la Compagnie de Saint-Gobain, Vieilles archives, *carton*.

tember, 1673; and Louis XIV again forbade such trade.[74] Additional confirmatory orders were issued on March 16, 1675, July 29, 1684, August 4, 1685, and February 25, 1698;[75] and the letters patent issued the Royal Plate Glass Company on December 31, 1683, December 14, 1688, April 19, May 1, and October 15, 1695, and October 23, 1702, also prohibited imports of mirrors and plate glass. Nevertheless, the trade was continued underground.

Many smugglers were caught and tried.[76] Sometimes the agents of the Royal Plate Glass Company at Marseille became overzealous in their duties and actually seized some of their own glass as contraband. What is more curious is the fact that the court upheld their action because one or two of the experts whom it consulted could not definitely decide whether the glass was of French or Venetian manufacture.[77] Even secondhand mirrors made in foreign countries or those which had been imported into France before 1672 were confiscated when offered for sale. If the law was to be administered so that smugglers could find no loopholes in it, the officials claimed, such measures as these were necessary even though they caused injustice to some few citizens.[78] Smugglers were admittedly ingenious. In order to bring glass into Lyons from the principality of Dombes, they built boats with false bottoms; sank cases of glass along the edge of the river and surreptitiously brought them into the city by night; and hid contraband, disguised as sacks of wheat, in a miller's house near Lyons and conveyed it into the city limits on propitious occasions.[79]

Most of the responsibility for preventing or detecting smuggling

[74] By order of April 1, 1674 (Archives de la Compagnie de Saint-Gobain, Vieilles archives, *liasse* 1665–1737).

[75] Archives nationales, AD^{xi}. 53; Archives départementales des Bouches-du-Rhône, B. *registre* 121, fol. 206; Archives de la Campagnie de Saint-Gobain, Vieilles archives, *liasse* 1665–1737.

[76] The departmental archives at Marseille contain considerable information about these (B. *registre* 121, fols. 206–7; C. *registres* 2182, fols. 238, 279–80, 348–49; 2185, fol. 436; 2189, fols. 372–87; *liasse* 2220, doc. 1).

[77] Archives départementales des Bouches-du-Rhône, C. *registre* 2188, fols. 549–60 .

[78] *Ibid.*, fols. 477–97, 517–20; Archives départementales de l'Hérault, C. 2759.

[79] Archives nationales, F^{12}. 1491; G^{7}. 367 (23 juillet 1715), 1690; Archives de la Compagnie de Saint-Gobain, Vieilles archives.

was placed upon the Royal Plate Glass Company itself. This is clearly shown in the provisions of an order which was issued on August 1, 1711, in response to a petition presented the king by the company's associates.[80] The entry of all plate glass and mirrors into Marseille—even if for transit or entrepôt purposes—was prohibited under pain of 3,000 livres fine and confiscation by the company of the goods and ships involved. The company's agents, assisted by royal officials, were permitted to visit all ships and barks casting anchor at Marseille or in "oblique places," to open all cases of their cargo if necessary, and to visit all shops in the city. Customs agents, furthermore, were forbidden to allow mirrors or plate glass to enter France under any conditions whatsoever. The captains of ships taking refuge in the Marseille port because of "tempest, pursuit of enemies, or other fortuitous causes" and having cases of plate glass on board had to declare their cargo within twenty-four hours of their arrival and to store it in rooms provided by the Royal Plate Glass Company until their ship's departure. Finally, in order to facilitate the enforcement of the law, it was provided that all cases of glass shipped anywhere in southern France had to be stamped with the company's seal.

In the long run, domestic competition proved to be more troublesome than foreign competition, even though all the letters patent accorded the company assured it a complete monopoly in the production of plate glass throughout France. Its associates had to be constantly on guard lest some entrepreneur violate their exclusive privileges. De Hennezel of a famous glassmaking family in Lorraine was forced by royal order of April 19, 1669, to close his shop in a Parisian suburb,[81] and the Marquis de Courtenvaux finally decided in 1696 to sell the independent plate- and crystal-glass shop of Rougefossé on his barony of Montmirail in Normandy so that he would not become embroiled in litigious proceedings.[82] Bernard Perrot, who probably had invented the glass-casting process, was forbidden in March, 1696, to cast plate glass in his crystal shop at Orléans, as he had certainly done before

[80] Archives nationales, F[12]. 1491.

[81] Archives de la Compagnie de Saint-Gobain, Vieilles archives.

[82] *Ibid.*; see also above, pp. 675–76.

Thévart's company was organized.[83] In the same year several Norman glassmakers and Parisian mirror merchants lost their fight before the king's council with the Royal Plate Glass Company over their pretended right to make optical and plate glass.[84] And in the second decade of the eighteenth century Laurent de Mathieu, sieur de Vauchaux, was fined and imprisoned for several months in the Bastille because he had illegally made some in his shop (La Boue) in Nivernais.[85]

None of these entrepreneurs competed very much with the Royal Plate Glass Company, but others seriously threatened its position. In 1699 several men were authorized by the Duke du Maine, son of the king and Mme de Montespan, to build a large plate-glass factory at Beauregard in the principality of Dombes.[86] Louis XIV denied them the right to sell any of their output in France but, on March 9, 1700, allowed them to ship their glass to foreign markets along prescribed routes across French territory. Shipments intended for Italy or the Levant could descend the Saône and the Rhône rivers to Marseille; those for Savoy, Switzerland, and Germany were to follow the Saône to Lyons and then to be carried overland to Coulanges; and, finally, those for England and Holland could be sent overland to Roanne and then to Nantes on the Loire River.[87] Because of its limited market, the attitude of the French crown, the hostility of the Royal Plate Glass Company, the mismanagement of its own officials, and its heavy overcapitalization, the Dombes company was soon smothered by debts and encumbered with excessive stocks of finished and partly finished plate glass.[88] The fires in its furnaces were allowed to die

[83] Archives départementales du Loiret, A. 396; B. 261.

[84] Archives nationales, AD^{xi}. 53; E. *registre* 1895 (10 mars 1696); F^{12}. 640, 1491; T. 14^{1}, *côte* 10; Archives départementales des Bouches-du-Rhône, C. 2220, doc. 2; Archives de la Compagnie de Saint-Gobain, Vieilles archives, *liasse* 1665–1737; Bibliothèque nationale, Fonds français, MSS 11768, p. 433; 21733, fols. 143–45.

[85] Archives nationales, F^{12}. *registre* 59, fols. 190–91; *liasse* 1486; G^{7}. 1728; Archives de la Compagnie de Saint-Gobain, Vieilles archives, *liasse* 1665–1737; Abbé Boutillier, *La Verrerie et les gentilshommes verriers de Nevers, avec un appendice sur les verreries du Nivernais* (Nevers, 1885), pp. 124–25.

[86] Archives nationales, V^{8}. 2; Archives départementales de l'Ain, C. 554.

[87] Archives nationales, E. *registre* 1911 (9 mars 1700); F^{12}. 1491; G^{7}. 1690.

[88] *Ibid.*, F^{12}. 1491; G^{7}. 1690; K. 1198.

out on April 22, 1708, and its owners proceeded to wind up their affairs.[89] Very much the same thing happened in Lorraine, which was still nominally independent of France. The Portieux glass factory there tried to operate a plate-glass shop from 1714 to 1722 or 1723, but it was unable to withstand the keen competition offered by the Royal Plate Glass Company.[90]

The Saint-Quirin factory in the Three Bishoprics was much more fortunate. Built in 1739 and 1740 as a crystal-glass shop, it was soon making abundant quantities of sheet glass which rivaled in beauty that cast at Saint-Gobain or blown at Tourlaville;[91] furthermore, it was still prospering in 1789. Meanwhile, two other enterprises began to make plate glass. One, a large factory protected and subsidized by the Burgundy *états*, was established at Rouelle in 1759 and continued to operate for almost twenty years.[92] The other was the Fère-en-Tardenois shop near Saint-Gobain.[93]

Since neither the Dombes nor the Portieux furnaces were built in France proper, the Royal Plate Glass Company was not able to have them destroyed on the grounds that they were illegal; and it was afraid to prosecute the producers at Saint-Quirin, Rouelle, and Fère-en-Tardenois, who were overtly contravening its charter. Public opinion had turned against monopolies in general, and the company had experienced great difficulty in having its exclusive privileges renewed in 1757. Jean Le Clerc, master of a bottle factory at Nantes, at this time had inundated the king's council with tracts extolling the merits of unfettered competition and laying bare the enormous profits of the monopoly.[94] One of its associates explained that "we do not hinder our enemies from

[89] *Ibid.*, V[1]. 2; Archives départementales de l'Ain, C. 555.

[90] A. Fournier, *La Verrerie de Portieux* (Nancy, 1886), pp. 22 ff.; Rodier, *op. cit.*, p. 23.

[91] Bibliothèque nationale, Collection Moreau, MS 1384, fol. 236.

[92] Archives nationales, F[12]. 680, 1489; O[1]. 1991, *côte* 6; Archives départementales de la Côte-d'Or, C. 44, 3720; Archives de la Compagnie de Saint-Gobain, Vieilles archives, *carton*.

[93] Archives de la Compagnie de Saint-Gobain, *Historique de la verrerie*, pp. 80 ff.

[94] Archives nationales, F[12]. 640, 1491; Archives départementales d'Ille-et-Vilaine, C. 3929; Archives de la Compagnie de Saint-Gobain, Vieilles archives.

shipping their plate glass to Paris because we are afraid that otherwise a juridical dispute would arise which would have to be carried before the Council of Trade, in which event . . . . we would indubitably lose."[95] They decided, instead, to adopt policies involving local price discrimination which they hoped would ruin all their competitors;[96] and, as to Rouelle, they were successful. Saint-Quirin, however, survived and in 1789 finally obtained a royal order permitting it to blow plate glass but forbidding it to use the casting techniques.[97]

VIII

It would be a mistake to ascribe either the size or the financial success of the Royal Plate Glass Company wholly to the monopoly position it enjoyed. It has been pointed out in the immediately preceding section that, in reality, its associates faced competition from at least three domestic producers after 1750; yet the company enjoyed its greatest prosperity during the forty years preceding the Revolution. It unquestionably benefited from all the tax exemptions on its raw materials and finished products which the crown accorded during the seventeenth and first half of the eighteenth century, but these exemptions were gravely abridged after 1750.[98] It would seem, therefore, that other factors were also responsible for its phenomenal growth.

From the very beginning the technology of making plate glass was such that production on a relatively large scale was almost inevitable. Until 1688 plate glass was blown in the shape of large cylinders, which were slit and then flattened out in specially built ovens; and, before it could be silvered for mirrors, it had to be carefully finished. As a result, its production required much more equipment than was necessary for making windowpanes or other glass objects not usually ground or polished. Not only did the Royal Plate Glass Company maintain a separate finishing plant

[95] Archives de la Compagnie de Saint-Gobain, Vieilles archives.

[96] *Ibid.*, *Délibérations*, fols. 126, 133.

[97] Archives nationales, T. 591[4], *côte* 9.

[98] Scoville, "State Policy and the French Glass Industry, 1640–1789," *op. cit.*, pp. 448, 452.

at Saint-Antoine throughout the period of this study, but it also built grinding and polishing shops at Saint-Gobain and Tourlaville after 1771.[99] Whether it harnessed water power to move its polishing wheels, as the Saint-Quirin factory did in 1769,[100] I do not know.

France made her most important contribution to the general technology of glass production when the process of casting or rolling plate glass was substituted for the old techniques involved in blowing. This innovation had several important consequences: (1) larger and thicker sheets of glass could be made; (2) the labor costs of production were lowered; and (3) the heavy investment of capital required to build the large casting furnaces and to instal the other necessary equipment placed a premium on large-scale production.[101] After 1695 most of the glass made by the Royal Plate Glass Company was cast instead of blown.

The company, on the whole, appears to have been much more anxious to improve its techniques than were the owners of other glass factories. This was doubtless due in part to its early break with the custom-bound *gentilshommes verriers* and to the new blood and capital which the merchants and bankers brought with them from the commercial market when they became part owners in the enterprise.[102] During the latter half of the eighteenth century the associates hired two research chemists for a few years in the hope that they would succeed in improving the quality of their product,[103] and they gave evidence of their enterprising spirit in

[99] Archives de la Compagnie de Saint-Gobain, Vieilles archives, *liasses* and *cartons* and *Historique de la verrerie*, p. 213; Archives départementales du Calvados, C. 2975.

[100] Archives nationales, F[12]. 1300; T. 591[4], *côte* 9.

[101] For a fuller discussion of these consequences see my article "Technology and the French Glass Industry, 1640–1740," *op. cit.*, pp. 156–58.

[102] The capital invested in most common- and white-glass shops throughout the period of my study was supplied by the members of noble glassmaking families. During the eighteenth century, merchants, bankers, and other manufacturers who understood little of the techniques of glass production became, for the most part, associates of only bottle and plate-glass factories.

[103] Archives de la Compagnie de Saint-Gobain, Vieilles archives, *liasses* and *Délibérations*, fol. 115. Most glass shops in France, of course, were so small that their owners could not have financed technical research even if they had so desired.

still another way. Although the Royal Plate Glass Company continued to burn wood in its furnaces almost exclusively from 1665 to 1789, its owners experimented with coal. In 1737 they tried to burn coal at Tourlaville while glass was being melted, and on September 7, 1749, they sanctioned the construction of a specially built coal furnace. Again, in 1763, similar experiments were tried at Saint-Gobain, but the substitution of coal for wood never was wholly satisfactory or popular.[104] According to the scale upon which technical research is undertaken by present-day industries, the activities of the plate-glass company seem insignificant, but they were rather unusual for that day.

IX

Another factor which must be taken into account if the growth of the Royal Plate Glass Company is to be "explained" is the expansion in its markets. Plate glass and mirrors were truly luxuries. When Henry IV sent Sully to England in 1603 for the coronation of James I, Sully carried a large Venetian mirror as one of the valuable gifts for the sovereign.[105] Upon Colbert's death in 1683 a large mirror measuring 46×26 inches, incased in a silver frame, was valued in the inventory of his personal possessions at about 8,000 livres; and an original Raphael was listed at only 3,000 livres.[106] Mirrors really were a mark of one's social standing, and the age of Louis XIV was characterized by extravagant and luxurious living of the wealthy nobles, who were, in turn, aped by the successful bourgeois. The king achieved magnificence when he built the Hall of Mirrors at Versailles, which he thought a fitting setting for the grandeur and sparkle of his person and court. Nobles in Paris and Versailles then tried to follow his example. During the first decade of the eighteenth century De Cotte, a royal architect, introduced the lowered fireplace and surmounted the mantel with a large mirror[107]—a style which has remained

[104] Cochin, *op. cit.*, p. 76; Archives nationales, F[12]. 1487; O[1]. 1992A, *côte* 4; Archives de la Compagnie de Saint-Gobain, Vieilles archives, *liasses* and *cartons* and *Historique de la verrerie*, pp. 20, 21.

[105] Cochin, *op. cit.*, p. 10.

[106] *Ibid.*, p. 32.

[107] *Ibid.*, p. 44; Archives de la Compagnie de Saint-Gobain, *Historique de la verrerie.*

popular in France to the present day. Vanity tables, dressers, and bureaus decorated and equipped with mirrors first became popular in France, it seems, during the reign of Louis XIV.[108] At the same time cheval glasses were introduced, and coaches and sedan chairs equipped with plate-glass windows became the fashionable means of travel among the rich.[109] In their homes panes were placed over fine paintings, etchings, and prints in order to protect them from dust.[110]

Throughout the eighteenth century most of the glass made by the Royal Plate Glass Company was sold to members of the royal family and to nobles residing in Paris and Versailles. Louis XIV and Louis XV lavishly decorated their palaces and country estates with plate glass and mirrors. From 1695 through 1786 royal purchases from the company each year varied from a few thousand livres in 1702, 1715, and 1718 to almost 90,000 livres in 1724 and 1786.[111] Louis XIV confessed in the letters patent accorded the company in 1665 and in later ones which confirmed and renewed its monopoly privileges that his action was partly motivated by the desire to create an abundant and cheap supply of plate glass and mirrors for his own palaces and the "principal houses of our subjects."[112] Toward the end of the eighteenth century fashionable cafés and restaurants in France also began to take advantage of this supply of mirrors and to decorate their interiors. Private individuals of moderate means still could not afford to buy any but the smallest pieces, for the medium-sized ones (those between 40×30 and 50×35 inches) each cost from 100 to 255 livres from 1699 to 1734 and the largest ones (those above 90×55 inches) each cost over 2,000 livres.[113]

[108] Jules Henri Alexandre, *A travers glaces* (Paris, 1862), p. 99.

[109] According to Voltaire (*Œuvres complètes de Voltaire* [new ed.; Paris, 1817], XIII, 579), this mode was introduced by the king himself, when he followed his victorious army into Flanders in 1670 in a coach equipped with glass panes.

[110] Archives nationales, AD^{xi}. 53 (*arrêt* of December 31, 1743).

[111] *Ibid.*, F^{12}. 640; O^{1}. 1990, 1991, *côtes* 8–12, 1992A, *côtes* 1 and 2; Archives de la Compagnie de Saint-Gobain, Vieilles archives. From 1695 through 1786 the company sold more than 1,832,000 livres of mirrors and plate glass to the king.

[112] See, especially, the letters patent of October 23, 1702 (Archives nationales, F^{12}. 640).

[113] Bibliothèque nationale, Fonds français, MS 14115, fols. 32–35.

Not only was the domestic market for its products expanding during the eighteenth century, but the Royal Plate Glass Company was also beginning to participate in France's growing foreign trade. French mirrors already adorned palaces in Petersburg and Constantinople, as well as those of the king of Siam,[114] and after 1760 the associates gave a great deal of their attention to developing the foreign market. They opened wholesale stores in Geneva and Constantinople and offered foreign buyers substantial discounts in price.[115] As a result, exports of plate glass and mirrors increased until they amounted to 952,300 livres in the year 1788.[116] From 1770 through 1782 they averaged 334,115 livres annually and surpassed in value windowpanes or any other kind of glassware exported from France.

X

To a considerable extent the expansion in both the domestic and the foreign market for plate glass after 1720–40 reflected an improvement in economic conditions generally throughout France and western Europe. An industry producing such luxury goods as plate glass and mirrors naturally benefited from the increasing well-being of the middle class and the growing extravagance of the nobility. French industry as a whole prospered; and, "judged by the rate of increase in the volume of . . . . output and in the number of workpeople employed in mines and factories, the fifty years from 1735 to 1785 were possibly a period of even more rapid development in France than in England."[117] French relationships with foreign nations, furthermore, were much more conducive to expanding foreign trade than they had been during Louis XIV's

[114] Archives nationales, F[12]. 1486.

[115] Archives de la Compagnie de Saint-Gobain, Vieilles archives, *Délibérations*, fols. 133, 139.

[116] Archives nationales, F[12]. 241–52; 1834B, 1835; Bibliothèque municipale de Rouen, Collection Montbret, MS 155.

[117] John U. Nef, "English and French Industrial History after 1540 in Relation to the Constitution" in *The Constitution Reconsidered*, ed. Conyers Read (New York, 1938), pp. 93–94. See also Nef, *The United States and Civilization* (Chicago, 1942), pp. 21, 323. Cf. Germain Martin, *La grande industrie en France sous le règne de Louis XV* (Paris, 1900), p. 118.

aggressive reign.[118] Both as a response and as a stimulus to these conditions, the population of France increased from around 20,069,011 in 1700, according to the estimates of the intendants, to something like 26,300,000 on the eve of the Revolution.[119] Moreover, according to Professor Earl J. Hamilton, the price-wage relationship from 1726 to 1789 was conducive to industrial expansion.[120] The rising price level in France with the resultant lag of wages behind prices did not directly affect the Royal Plate Glass Company, for its selling prices were fixed by the crown from the very beginning, and the only changes made in its tariffs after 1720 were downward. The widening of its profit margin during the eighteenth century, therefore, was due to technological improvements. The general wage-price relationship, however, indirectly affected its development—as did other broad trends in France's constitutional, religious, social, intellectual, and military history—through the stimulus it gave to economic and industrial activity generally.

[118] Henri Sée has suggested that France's foreign trade increased fourfold from 1715 to 1789 and that "in this direction the development of France was even more rapid than that of England" ("The Economic and Social Origins of the French Revolution," *Economic History Review*, III [1931–32], 3). I am indebted to Professor Earl J. Hamilton for this reference.

[119] E. Levasseur, *La Population française*, I (Paris, 1889), 194–247, 284–88.

[120] "Profit Inflation and the Industrial Revolution, 1751–1800," *Quarterly Journal of Economics*, LVI (1942), 270.

DIMINISHING RETURNS IN FEDERAL TAXATION?

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THE defense and now the war efforts of the present decade have required drastic increases in federal revenues and will continue to require them. Witness the two revenue acts of 1940, the Revenue Act of 1941, and the current discussions and prognostications of the Revenue Act of 1942. In discussions of changing tax burden in a fiscal system involving numerous taxes the question of allocating the increment or decrement among the several taxes of the system arises inevitably. In the present controversy one of the strongest economic arguments used by the ostensible bearers of certain taxes is that these taxes have already reached or passed a point of diminishing returns. By this is meant simply that further rate increases will result in lower federal revenue. The doctrine is much less complex than the various forms of the "law of diminishing returns" in general economic theory.

The term "diminishing returns" will be limited to diminishing pecuniary returns in the short period, without regard to incremental administrative expenses. The major limitation—to pecuniary returns in the short period—serves to distinguish the diminishing-returns argument from a quite different charge frequently brought against the same taxes—the charge that they "eat the seed corn" or "kill the goose that lays the golden eggs." Retracing the second familiar argument will clarify the difference. Taxes on high incomes at progressive rates or double taxation of savings, to use the two most commonplace examples, discourage saving and investment. If saving and investment are discouraged, the growth of the national capital and income is retarded or possibly reversed. The real national income is eventually so greatly lowered, at least by comparison with its initial potentialities, that the real return to the government is less than it would have been at lower tax rates less discouraging to saving. Criticism of this hardy peren-

nial would involve consideration of the optimum propensity to consume, which is far beyond the scope of this essay. It suffices here to point out that the second argument runs in terms of diminishing real income in the long period and is therefore quite distinct analytically from the diminishing-returns argument under present discussion.

The levies against which the diminishing-returns argument is directed fall into two groups. The first includes the principal federal excises on tobacco (small cigarettes, smoking tobacco, chewing tobacco) and on liquor (distilled spirits, fermented malt liquors). The second group comprises two aspects of the individual income tax—the definition of income as inclusive of capital gains and the extension of the progressive principle into the upper brackets of income.[1] The first group of taxes are regarded as generally regressive; the second, as progressive. The social significance of the argument must be determined by the alternative taxes which its proponents offer. These alternatives are invariably regressive in nature in the relatively rare cases when they are specified. They are general sales taxes (to "equalize the burden"

[1] Perusal of the published hearings before the House Ways and Means Committee and the Senate Finance Committee, preliminary to the drafting of the Revenue Act of 1941, reveals numerous examples of the argument in the oral or written testimony of witnesses and in the comments of committee members. The hearings before the House Committee are entitled *Revenue Revision of 1941;* those before the Senate Committee, *Revenue Act of 1941*. (Both were published at Washington in 1941.) We refer to them as *House Hearings* and *Senate Hearings*, respectively.

a) The doctrine of diminishing returns applied generally to the bill as a whole: *House Hearings*, pp. 35, 58, 65, 1491–1513.

b) The doctrine applied to specific excises: advertising matter (in any form), *Senate Hearings*, p. 442; automobiles, *House Hearings*, p. 1767; beer, *ibid.*, pp. 1073–76, 1087, 1106, 1118, 1121, 1137, 1140; *Senate Hearings*, pp. 860–71; checks, *House Hearings*, pp. 930–42; chewing tobacco, *ibid.*, pp. 179–212; cigars (certain grades only), *ibid.*, p. 993; cigarettes, *ibid.*, pp. 715, 725, 757, 763, 790, 819; distilled spirits, *ibid.*, pp. 1047, 1287, 1301, 1303; *Senate Hearings*, pp. 1111–28, 1132, 1235; gasoline, *House Hearings*, p. 43; industrial alcohol, *ibid.*, pp. 492, 497; *Senate Hearings*, pp. 351 f.; manufactured tobacco, *House Hearings*, p. 989; wine, *ibid.*, p. 1116.

c) The doctrine applied to aspects of individual income tax: capital gains, *Senate Hearings*, pp. 92, 99, 381, 383; higher brackets, *House Hearings*, p. 1511.

In addition, the term was used in connection with inclusion of savings in income (*House Hearings*, pp. 1052–56; *Senate Hearings*, pp. 525–32), but with the clear meaning of diminishing real returns in the long run.

between commodities) and higher rates on the lower brackets of income taxes, usually with lower exemptions (to permit more citizens the "opportunity" of contribution).

The argument has practical significance and will acquire it increasingly as the level of federal taxes increases. It probably affected the contents of the present revenue act, in which rates on tobacco and beer were essentially untouched despite Treasury recommendations for increases. It received United States Treasury approval during the Wilson, Harding, Coolidge, and Hoover administrations and has been highly persuasive to individual members of congressional committees since 1933.[2] In Great Britain it dates at least from the Disraeli-Gladstone debates, and it at one time influenced the current chancellor of the exchequer, Sir Kingsley Wood, to advocate further borrowing instead of tax increases of any kind.[3] Sir Kingsley's opinion appeared to be that the entire British tax system, to say nothing of individual components, had reached what he terms "the limit of taxation."

The argument takes two forms, which will be considered separately. A direct form limits attention to the specific levy under consideration. As applied in direct form, the argument applied to the tax on beer states simply that an increased rate would decrease revenues from the tax on beer, and vice versa. An indirect form applies to the general federal tax system. As applied to the beer tax, it states that even though an increased rate may increase receipts from beer, it will decrease receipts from other taxes by more than enough to offset the gross increase.

[2] See statements of Representatives Reed (R., N.Y.), *House Hearings*, p. 35; Dingell (D., Mich.), *ibid.*, p. 58; and Disney (D., Okla.), *ibid.*, pp. 64 f., in connection with the Revenue Act of 1941.

[3] The Commons debate referred to took place in October of 1941, when Sir Kingsley, as chancellor, moved additional credits amounting to £1,000 millions ($4 billions, at current rates of exchange). The debate was the subject of an editorial entitled "The Limit of Taxation," in the *Economist* (London) October 11, 1941, pp. 442 f.

The subsequent British budget for the fiscal year 1943, while acceding to the "limit of taxation" argument as regards personal-income taxes, did, however, provide for increased customs and excise duties. The relevent "White Paper Statistics" are reprinted in *ibid.*, April 18, 1942, p. 531.

DIRECT FORM: EXCISE TAX

Consider first an excise. The government's receipts prior to the tax increase are q (quantity of commodity sold) multiplied by t (the existing rate of tax). (This illustration runs in terms of a specific tax and can readily be converted to apply to an ad valorem tax.) When the tax is increased to $t+dt$ by an increment dt, the quantity sold falls to $q+dq$, the size of the decrement, dq, being related to dt by the elasticity of demand for the commodity and by the price increase resulting from the tax. We wish to explore the conditions under which $(t+dt)\,(q+dq)$ falls short of tq, for under these conditions the diminishing-returns argument holds in its direct form.

The basic inequality

$$(t+dt)\,(q+dq)<tq$$

reduces to

$$\frac{dq}{q}+\frac{dt}{t}<0\,.$$

Let the elasticity of demand for the commodity be η,[4] and let p be its price (prior to the suggested tax increase). Let k be the proportion of the tax increase dt passed on to the selling price of the commodity, so that dp may be re-written $(k\,dt)$. (The value of k may be greater than, less than, or equal to, unity.) The last expression may then be written

$$\frac{dt}{t}-\frac{\eta\,k\,dt}{p}<0 \qquad \text{or} \qquad \frac{\eta\,k\,dt}{p}>\frac{dt}{t}\,.$$

Division by the suggested percentage increase in tax (dt/t) gives the final result:

$$\frac{\eta kt}{p}>1\,. \tag{1}$$

The truth or falsity of the argument depends upon three factors. A high elasticity of demand for the commodity, a high proportion of tax passed on, a tax already high with relation to the selling price of the commodity—all tend to support it, whether singly or in combination.

[4] The elasticity is defined so as to be positive for a negatively sloping demand curve. If the opposite sign is used, the direction of inequality (1) is reversed.

But if we tabulate (1) for several representative values of k (the proportion of tax passed on), we can see that in practice the argument is usually invalid. Ridiculously high values of η (the elasticity of demand) or of t/p (the ratio of existing tax to existing price) are required before it can be true (see Table 1).

TABLE 1

If η Is	t/p Must Exceed			
	When 75% of Tax Is Passed On	When 100% of Tax Is Passed On	When 125% of Tax Is Passed On	When 150% of Tax Is Passed On
0.05	26.67	20.00	16.00	13.33
0.10	13.33	10.00	8.00	6.67
0.25	5.33	4.00	3.20	2.67
0.50	2.67	2.00	1.60	1.33
0.75	1.78	1.33	1.07	0.89
1.00	1.33	1.00	0.80	0.67
1.25	1.07	0.80	0.64	0.53
1.50	0.89	0.67	0.53	0.44
2.00	0.67	0.50	0.40	0.33
2.50	0.53	0.40	0.32	0.27
3.00	0.44	0.33	0.27	0.22
4.00	0.33	0.25	0.20	0.17
5.00	0.27	0.20	0.18	0.13

If we remember that t/p cannot in any case exceed unity and that commodities selected for excise taxation are generally conventional necessities with demand elasticity substantially less than unity, it becomes clear that the diminishing-returns argument in its crude form can be valid if and only if its proponents (the manufacturers of the taxed commodities) will pass on substantially more than 100 per cent of the tax to the final consumers.

A special case in which the argument has greater validity is presented where evasion is quantitatively important. Consider the problem of distilled spirits. Here t/p is higher than for any other commodity subject to federal excise and highest in the case of cheap whiskeys, which are in most vigorous competition with the bootlegged product. There the elasticity of demand for legal (tax-paid) whiskey is probably considerably greater than for

whiskey as a whole. In applying the diminishing-returns argument to their industry, the whiskey producers stress the importance of bootleg competition and are supported by representatives of state liquor-control agencies.

An occasional attempt is made to base the argument on cost and supply conditions exclusively. Spokesmen for the brewers placed a portion of their attack on the proposed increase in the beer excise in 1941 on this basis. The declining volume of beer sales if the tax increase were passed on fully would force a number of high-cost "marginal" breweries out of business. These same breweries could not afford absorption of any consequential fraction of the tax. Their output would cease, and the approximate amount of the tax on their present production would be lost to the government—a loss more than balancing any increase from supramarginal breweries. The present output of marginal breweries is, we must assume, more than the fall in quantity demanded as computed on elasticity considerations with the tax increase shifted in full. This approach is valid only if the surviving supramarginal breweries cannot expand their production without drastic increases in unit costs. Its validity depends, in fact, on almost perpendicular discontinuities in average-cost curves. The situation reduces otherwise to a case dealt with already—that in which the new equilibrium price differs from the preceding one by an amount greater than the tax.

Since the direct diminishing-returns argument is probably fallacious except under highly special circumstances, it is relevant to inquire into the grounds for its rather widespread support. Probably some part of this support can be discounted as oratory on behalf of special interests or as expression of the "practical man's" characteristic disdain for economic theory and Treasury bureaucracy. On the other hand, certain fallacies of a more subtle sort may be involved.

First, an aura of confusion between the percentage increase in tax and the percentage increase in price hovers over the argument. The former is, of course, always the lower. Even though it be true that a given percentage rise in price will lower gross receipts, it is not true that the same percentage rise in tax will have

the same effect. The fallacy may be described as the assumption of an existent 100 per cent tax rate.

Second, the elasticity of demand for the product of the individual firm seems quite generally to be confused with the elasticity of demand for "the product," defined as the taxed commodity. The former is almost always substantially higher; when the businessman speaks of demand, it may be the former which he has in mind. Even though the elasticity of the particular demand curve of an individual firm may justify the doctrine of diminishing returns, the elasticity of the market demand curve does not. The fallacy here is the unconscious assumption that the tax does not apply to competitors within the taxed industry.

Third, and most important, the receipts of the government are, I think, assumed to vary in the same direction as the receipts of the taxed industry. It may be true—it is probably true, in cartelized industries—that the net receipts of the industry after taxes will fall when the tax increases. An elementary proposition in economic theory states that this must follow if the industry is organized monopolistically and is maximizing its profits prior to the tax increases. But this conclusion does not indicate a loss of revenue by the government as well. This can be seen most clearly by considering the case of an industry previously untaxed, subject to a considerable degree of monopoly or cartel control. Such an industry would almost certainly lose revenue net of taxes as a result of the imposition of any tax, but the government would certainly gain if it collected any tax whatever.

Finally, there are supports drawn from uncritical use of revenue statistics. Revenues from a given tax are compared before and after a recent tax increase, or else are compared for two widely separated years with approximately identical income levels (such as 1940 and 1930).

The principal fallacy in the first type of comparison mentioned is the lack of any allowance for anticipatory, or forward, buying. Such buying increases receipts above normal in the last months of lower taxes and also decreases them abnormally in the first few months of higher taxes. When such comparisons are made, the base of any floor-stocks taxes should be ascertained; and all taxes

collected on this base should be allocated to the later year regardless of the date of their collection. And even this will seldom provide complete adjustment. Floor-stocks taxes are difficult to collect completely; they sometimes allow substantial quantitative exemptions, and they do not apply to stocks in the hands of final consumers. Floor-stocks taxes are not generally levied in connection with the majority of federal excises. Proper procedure in comparisons of the type mentioned would provide for estimates of the amount of anticipatory buying. Or, alternatively, students might compare not entire years but corresponding months in which anticipatory buying had not developed in the earlier year and in which its effects had subsided in the later one. It will be difficult to find such months for comparisons between receipts under the revenue acts of 1940–42 because of the extraordinary volume of anticipatory purchases in August and September of 1941 and because of the persistence of purchases anticipatory to further increases or to possible rationing.

A less important fallacy in comparisons of this kind has obvious relations to price theory. Let year a be immediately prior to a tax increase, and year b be immediately following. The national income paid out in a is y_a and consumption of the taxed commodity, q_a; similarly for year b, with changed subscripts. The test consists in comparing the revenue from q_b at the higher rate with the hypothetical revenue from $q_a\ (y_b/y_a)$ at the old rate, on the theory that consumption should move proportionately with income under normal conditions. When b is a year more prosperous than a (as 1940 was more prosperous than 1939), diminishing returns are easy to "prove."[5] The basic assumption here is obviously one of a unitary income elasticity of demand for the taxed commodity. It

[5] This attempt at legerdemain underlay the most pretentious attempt at scholarly presentation of the case for diminishing returns to congressional committees during the 1941 hearings. The "research" in question was conducted by a firm of consulting engineers (!) at the behest of the United States Brewers' Association. Their "Report on Effect of the Excise Taxes on the Brewing Industry" was presented to the House Committee *in toto*, and certain emendations were presented to the Senate Committee as well. See *House Hearings*, pp. 1080–1106, esp. 1084, and *Senate Hearings*, pp. 863–69, esp. 865.

is a quite substantial overestimate in the case of the conventional necessities subject to federal excise.

The second type of statistical comparison, between periods widely separated in time but approximately equal in national income, leads to erroneous results if variables other than revenue, tax rate, and national income are not introduced into the analysis. With regard to chewing tobacco, to cite one flagrant instance, witnesses ascribed the decline in consumption to tax-rate increases—with a kind of distributed lag causing steady declines even over periods of constant tax rates. This picture ignores such factors as the rise of the cigarette industry, changes in the relative social prestige accorded smoking and chewing, changes in the relative volume of advertising devoted to smoking and chewing, the shift of population from rural to urban areas, and the demise of an older generation of tobacco "chawers." Certain of these factors are difficult to measure statistically, it is true. Lumping them into a "trend" is a question-begging device for the present purpose, but ignoring them altogether may lead to equally erroneous results.

DIRECT FORM: INCOME TAX

The development which leads to inequality (1) does not apply in its entirety to diminishing returns from income taxes, for income taxes involve no "product price" as do the excises. The alternative development is formally even simpler. If q is taken to represent the size of the tax base and t the existing tax upon it (both base and tax being measured in dollars), while dt is the proposed change in the tax, the same derivation process which developed (1) leads to:

$$q\,dt + t\,dq < 0\,,$$

$$\frac{q\,dt}{t\,dq} < 1\,,$$

$$\eta_t > 1\,.$$

In other words, the elasticity of demand for income (of a certain type or in a certain bracket) with respect to tax (the tax elasticity, we may call it, and distinguish it by the subscript t) must exceed unity for diminishing returns to ensue.

There is little reason for believing this to be the case with respect to ordinary income (exclusive of capital gains and losses) even in high brackets. The rate in any one bracket is never changed, in practice, except with some regard to its relationship to the brackets above and below. The rate differentials between brackets are generally quite small and are kept relatively constant. If a taxpayer's effective rate of income tax is raised, the effective rates for taxpayers in the bracket below are likely to increase also, so that the differentials between their incomes net as well as gross of taxes are left substantially unchanged. The upshot is that, if it was not worth while for the taxpayer to suffer a lowered income before the tax increase, it will hardly be worth his while to suffer it afterward.

An important qualification must be made to the conclusions of the last paragraph. There we supposed that the taxpayer could decrease his taxable income only by diminishing his total money income *pro tanto*. In practice, he may diminish it otherwise by utilizing increasingly costly methods of tax avoidance. (He may divest himself of a greater or less degree of control over assets and pay large fees to attorneys and "trustees" into the bargain.) Or he may transfer his assets from taxable to nontaxable forms, thereby decreasing taxable income substantially more than money income.[6] If we allow for the increasing profitability of tax avoidance as rates increase, it is quite possible for the tax elasticity to exceed unity and for the diminishing-returns argument to hold if we redefine "income" to mean only income reported as taxable by the economic recipient, who will not in all cases be the legal recipient. The problem is quite analogous to that of distilled liquor considered in connection with excises.

We should not overlook completely the discouraging effect of high income taxes upon highly aleatory investments which will either raise or lower an individual's income by a large number of brackets, though the importance of this factor is minimized when,

[6] Shifting of assets to tax-exempt state and municipal securities was the primary mechanism by which Mr. Andrew W. Mellon, when *Secretary of the Treasury*, conceived diminishing returns to operate in the case of high surtaxes (see his *Taxation: The People's Business* [New York, 1924], pp. 13, 17, and 76–79, and chap. viii).

as at present, the uncertainty-bearing function is shifted in large measure to the government.[7] Discouraging effects of this kind have been illustrated by the Twentieth Century Fund's study, *Facing the Tax Problem*, with an example which has become classical despite the obsolescence of its figures:

> Suppose, for example, that an investor estimates roughly he has one chance in ten of succeeding in venture A, where success will bring $500,000, and one chance in two of succeeding in venture B, where success will bring only $50,000. Suppose, further, that the two ventures are about equally attractive to him until he considers the income tax. A steeply progressive income tax that will cut down the net reward of venture A by a much larger percentage than it will the reward of venture B will induce him to choose venture B.
>
> The present [1936] Federal tax will cut the return from the risky venture from $500,000 to $194,000. Similarly, the gain from the relatively safe venture, B, will be cut from $50,000 to $40,300. A comparison of $194,000 with $40,300 is of course quite different from a comparison of $500,000 with $50,000.[8]

In these instances, the range between the alternative incomes gross of taxes is so great that generalized bracket rate increases in

[7] An editorial in the *Economist*, October 11, 1941, p. 442, expresses this point elegantly:

"What the 'limit of taxation' means is worth examining. In practice, when business depends almost entirely upon private enterprise and private risk, direct taxation has a plain relation to productive activity . . . . and the 'limit' of income taxes comes when a further rise will so reduce the willingness to venture and risk losses that on the one hand, taxation receipts will go down, and on the other, the national income will shrink. . . . . Similarly, rising taxes on labour, in war or peace, may impair production, but for rather different reasons. Workers may not be willing to work harder if their extra effort will yield them a disproportionately low net income, after taxation; they may prefer extra leisure. In wartime, the effects of taxes on entrepreneurs' incomes approximate to those of taxes on labour. Productive activity is mainly based, in wartime, not on private enterprise, but on Government order; it is the war production plan that sets the size of the national income. There is a fringe of unco-ordinated activity and uncompensated risk which raises quite serious social problems, but at bottom, entrepreneurs are paid agents rather than risk-bearers. . . . . But there is still a limit to taxation, for the capitalist may not react like the worker. . . . . It is not now his willingness to venture that is affected by the total rate of direct taxation, but his incentive to make extra efforts and his stimulus to produce efficiently."

[8] Carl Shoup (ed.); J. Roy Blough and Mabel Newcomer (assoc. eds.) (New York, 1937), pp. 62 f.

a progressive system cannot fail to increase the range between them and between net of taxes as well. But how important are large individual risk-investments by persons of established wealth? Wealthy persons generally attempt to diversify their investments, particularly their more risky ones, even in the absence of heavy income taxes. Income tax brackets being increasingly wide at high income levels, it is extremely unlikely that a single risky investment, made by a person of wealth, will alter his top bracket by more than one or two notches.[9] And in so far as a substantial number of risk investments are under consideration, each one in turn can be treated as marginal for analytical purposes. The theoretical conclusion (there are no statistics available, to the best of my knowledge, either to confirm or to deny it)[10] is that high-income taxation should tend further to diversify risk investments by wealthy persons, but that effects on their total amount are probably smaller than is believed generally. The observed scarcity of "venture capital" is more easily explicable on grounds of pessimistic anticipations and increasing power of restrictive pressure groups than on grounds of high taxes.

Capital-gains tax rates present problems still more difficult, despite the formal solution given above. Some part of the complexity is due to the capital-loss provisions, which have no explicit counterparts elsewhere in the tax system. These capital-loss provisions have permitted the capital-gains tax to be used during the

[9] This is not true for investments of corporations, especially smaller ones in process of growth. The diminishing-returns argument is probably valid as applied against progressive levies on corporate income and excess profits, and perhaps also against the absence of loss carry-over provisions in proportional taxes of this kind.

[10] Gerhard Colm and Fritz Lehmann (*Economic Consequences of Recent American Tax Policy* [New York, 1938], esp. pp. 44–56) come to opposite conclusions and cite statistical evidence that the relative importance of common stocks in estates increases with size.

They identify "common stock" with "risk investment" in a manner whose validity is somewhat dubious. Common stocks differ among themselves extremely widely in their aleatory character. Moreover, certain other forms of investment, notably "real estate" and "unincorporated business," may also involve very substantial risks. (The latter categories decline in importance, according to figures cited by Colm and Lehmann, as wealth increases.) Colm and Lehmann themselves point out that the distributions they studied may be determined by decisions made in previous generations—decisions which will not be affected by present tax laws.

period 1930–33 as a vehicle for wholesale income tax avoidance—diminishing returns in its most obvious form.[11] Since an increased rate on capital gains has generally meant an almost correspondingly increased deduction for capital losses, rate increases may certainly cause revenue decreases when the securities markets are falling. These increases may also encourage the establishment of fictitious losses, thereby leading to diminishing returns even in years of generally rising markets.

These possibilities are not referred to by proponents of lower capital-gains taxes when they urge reduction or outright repeal on diminishing-returns grounds. They claim that the capital-gains tax is largely responsible for the securities markets' manifest failure to keep pace with recovery in other segments of the American economy; that both the volume of securities transactions and the volume of capital gains are reduced by more than 1 per cent with each per cent of increase in the capital-gains tax. This is due in part to unwillingness to take gains and in lesser part to eagerness to establish losses.[12]

The decision to take or to postpone a capital gain or loss may be dominated in fact by considerations quite foreign to capital-gains taxation. Considerations of liquidity are immediate examples. More generally, one may think of cases in which the taxpayer has some specific use decided upon for his assets, toward which he is marshaling all marketable resources. But these are essentially crisis situations for the individual, if not for the entire economy. More usually, when the decision to realize or not to realize is made without definite plans or commitments as to the use of the proceeds, tax considerations undoubtedly enter into the final decision. But here the decision depends on comparisons of existing and an-

[11] Revenue legislation of 1934 and subsequent years has contained varying restrictions upon the amounts of net capital losses, particularly at short term, which could be offset against other income. Under the Revenue Act of 1941, there is no limit on deductions for long-term losses, while short-term losses are deductible only to the extent of short-term gains, with a one-year net loss carry-over.

[12] During stock-exchange booms, the capital-gains tax allegedly accentuates the boom by retarding the realization of gains. Depressed conditions are accentuated by the tax's action accelerating the realization of losses. The capital-gains tax is thus treated as a destabilizer at all stages of the business cycle.

ticipated market levels, of existing and anticipated tax rates, and not on the existing levels and rates exclusively. If the holder and taxpayer expects the market to rise in the future, and tax rates to fall, he will tend to hold fast to his asset. If he believes the reverse on both counts, he will probably sell.[13] If market considerations lead him in one direction, but tax comparisons in the other, a rational decision can be guessed at from a simple formula and the resulting table.

Let g be the taxpayer's gain from the present sale of an asset. If r be the rate at which this gain is taxed, then the taxpayer's gain net of tax is $g(1-r)$. Let dg be the additional anticipated gain, appropriately discounted for futurity from awaiting the anticipated change in market conditions and let dr be the increment which the taxpayer expects in the rate of capital-gains taxation during the same period.[14] He will sell immediately, unless for at least one future date the following condition holds:[15]

$$(g+dg)(1-r-dr) > g(1-r),$$

$$dg(1-r-dr) > g\,dr,$$

or, finally

$$\frac{1-r}{dr} > \frac{g+dg}{dg}. \qquad (2)$$

Under the present law the maximum value of r for long-term gains is 0.15. For simplification, we may express the right side of (2) in terms of g-units. This process involves setting g at unity, and yields:

$$\frac{0.85}{dr} > \frac{1+dg}{dg}. \qquad (2a)$$

[13] In this passage the taxpayer is assumed to be considering the realization of a gain. Reformulation in the case of a loss involves no special problems.

[14] These values are to be looked upon as averages of frequency distributions of subjective probabilities. They may be means, medians, or modes, depending on the taxpayer and the distribution. They may also be affected by the dispersion and the higher moments of the distribution, given a taxpayer with abnormal taste or distaste for gambling in general or for gambling on long shots in particular. Cf. A. G. Hart, "Risk, Uncertainty, and the Unprofitability of Compounding Probabilities," *Studies in Mathematical Economics and Econometrics* (Chicago, 1942), pp. 114–16; also H. Makower and J. Marschak, "Assets, Prices, and Monetary Theory," *Economica* (new ser.), V (1938), 271–73.

[15] Both dg and dr may be sufficiently large as compared with g and r respectively that the product $dg\,dr$ remains finite.

From (2) via (2a) is derived Table 2, assuming movements of r and g in the same direction (i.e., like signs for dg and dr).

TABLE 2

Anticipated Rate Change, Capital Gains Tax	Minimum Anticipated Proportional Change in Gain To Postpone Sale
0.05	0.0625
.10	.1333
.15	.2143
0.20	0.3077

The present situation, as most writers view it, presages increased taxes on income (including capital gains) in the future,[16] while controls over industrial prices, taxes, and concessions to agricultural and labor pressure groups will forestall offsetting rises in asset values. Other depressing factors of longer-run importance are the prospect of government competition and of great excess capacity when and if military production slackens. The forecast is for rising taxes and lower market values, which should tend to accelerate realization of gains (and losses as well) rather than the reverse, unless it breeds paralysis rather than defensive action.

A complicating feature for this analysis is the very real possibility of avoiding realization altogether by holding appreciating assets until death.[17] While the assets are valued for estate tax as at date of death or date of filing (the option resting with the estate), capital gains accruing during the lifetimes of present holders are not taxed as such. There is considerable discussion, both within and without the Treasury, of proposals for eliminating the resulting loophole in the estate tax by what is known as an "integration" device. Unless the present holders of appreciating assets regard themselves as paying their own estate taxes (a somewhat dubious general conclusion),[18] even an integration device will

[16] Except, of course, for gains now subject to treatment as short-term (100 per cent inclusion in income) which will receive more favorable treatment as intermediate-term or long-term gains (66⅔ and 50 per cent inclusion, respectively) in not more than eighteen and twenty-four months.

[17] Or until gift. The comments in the text below, phrased in terms of the estate tax, apply to the gift tax as well.

[18] Literature on the incidence of estate taxes is reviewed by James K. Hall, "The Incidence of Death Duties," *American Economic Review*, XXX (1940), 46–59. Hall concludes that the incidence is on the predecessor; he does not discuss the important point of whether or not the predecessor so regards it in practice.

probably leave unchanged the influence of capital-gains taxation as a factor postponing and preventing the realization of gains made in the market by persons with substantial resources.

Statistical support for the diminishing-returns doctrine, as applied to income taxes, may be found in comparisons between the 1926–29 and the 1940–42 situations.[19] The earlier prosperity was marked by extremely high capital gains and by a concentration of income in the upper brackets (over $100,000) which has not been equaled in the current defense boom. To ascribe any substantial part of the difference to income and capital-gains taxes would constitute gross neglect of other factors in the picture. A cursory list of the neglected factors has been presented in support of a pessimistic forecast for the securities markets. A further point should be made in connection with capital-gains taxation: the rate on such gains today is not as much higher than the 1929 rate as the bare figures would indicate. For a wealthy man the rates on capital gains have increased far less than the rates on income of other types. In 1929 the maximum income tax rate on long-term capital gains was 12½ per cent. In 1942 it is 30 per cent, but only half the long-term gain is included as income. The figure comparable with 12½ per cent is therefore the 15 per cent figure used in (*2a*).

INDIRECT FORM

Granted that a rate increase in a particular tax will increase revenues from this tax, the question arises whether the consequent indirect losses through income, excess-profits, estate, gift, and employment taxes are likely to offset the direct gain. The indirect form of the diminishing-returns doctrine upholds the affirmative. It remains to examine its implications for the United States at the present time.

If increased collections from a particular tax are balanced by corresponding increases in government expenditures, total community income is unchanged. Any secondary effects on total tax

[19] Secretary Mellon's book (*op. cit.*), once the Bible of the diminishing-returns doctrine as applied to income taxes, made similar comparisons for the period of World War I. Mellon compared revenues during depressed years under high rates with revenues during prosperous ones under the lower rates (*ibid.*, pp. 73–76, 83, 196).

collections are due to the substitution of public for private spending. They are probably negligible in importance. They seem as likely to be favorable as unfavorable to total tax collections, unless the initial collections are held idle for a considerable period.

In periods of deficit financing of recovery or war, however, the indirect diminishing-returns argument may be valid. Governmental expenditures are determined more or less independently of tax receipts, so that increased tax collections constitute net as well as gross deductions from total income and total purchasing power. To what extent is this net decrease reflected in lowered collections from other taxes?

Denote by x the amount of increased collections from a single tax. If governmental expenditure policy is not liberalized by the collection of x additional dollars, national income for the period (year) in question is reduced by mx dollars. Here m is a so-called "income" multiplier; a one-year period is assumed sufficient for its full effect. If c be the fraction of a typical increment or decrement in income which is reflected in total tax receipts, it follows that total tax receipts will decrease by indirection only if

$$cmx > x \quad \text{or} \quad cm > 1 .$$

A high value of the income multiplier, combined with a high percentage of marginal income taken in existing taxes, will bear out the indirect form of the diminishing-returns doctrine. But such a situation represents a type of financial instability which has far broader implications. In the first place, diminishing returns hold not only for one tax but for any tax whatsoever. (There is one exception—a tax on whatever idle balances remain idle under these inflammatory circumstances.) It also holds for government borrowing from private individuals, whether voluntary or mandatory, with the same exception. In the second place, it follows as a corollary that the way to increase revenues is to cut tax rates all along the line. The entire fiscal system has reached the limit of taxation.

It remains to bring the inflation bugbear into the picture. Tax decreases all along the line would, as has been said, increase government revenues measured in money terms. But such reductions

would, at the present time, be inflationary in the extreme. They would cause drastic increases in spendable funds in the hands of the public; material shortages and public policy would block corresponding increases in output. The government could finance its expenditures, over and above receipts from the lowered taxes, only by creating either legal-tender currency or government bank deposits. Either procedure is inflation par excellence. The conclusion seems inescapable; by the time we have retrogressed so far that the indirect diminishing-returns argument holds for any tax, there is no way out but inflation or drastic cuts in government expenditure.

The impact of defense spending and rising prices has raised the income multiplier for the United States well above the values computed for more depressed periods. The multiplier has probably increased from somewhat below to considerably above the middle of Professor Villard's confidence interval of 1.5 to 4.0.[20] The value of c, the proportion of an increment of income passing through the federal government as taxes, is not to be confused with the overall proportion of taxes to income. (One is a marginal, the other an average concept.) There are no figures available from which c can be estimated directly under the Revenue Act of 1941, but a first approximation can be computed under the revenue acts of 1940 from figures published in the *Annual Report* of the Secretary of the Treasury for the fiscal year 1940.[21]

According to these Treasury figures, a $10-billions increase in national income produced, from a stable level of $90 billions to a stable level of $100 billions, would result in $2.2 billions of increased receipts, from $11.2 to $13.4 billions. The resulting estimate of c is therefore 0.22, considerably higher than the propor-

[20] H. H. Villard, *Deficit Spending and the National Income* (New York, 1941), p. 180.

Computations covering the more prosperous 1920's yield higher figures. Professor Jacob Tinbergen obtains an estimate of 5.36 for the period 1919–32 (*Statistical Testing of Business Cycle Theories* [Geneva, 1939], II, 164) and suggests that a value of 6.0 is reasonable for the same period using another method of computation. See also J. J. Polak, "Fluctuations in United States Consumption, 1919–1932," *Review of Economic Statistics*, XXI (1939), 10.

[21] The figures may be found on p. 6.

tion of either national income actually collected in taxes. This value is probably an overestimate when income is increasing, as at present, and an underestimate when it is decreasing.

The computed value of c should be increased to allow for the effects of the Revenue Act of 1941. Treasury estimates of receipts in the fiscal year 1942 under prior legislation were $9 billions in President Roosevelt's budget message for that year,[22] to which $3.5 billions should be added as estimated full fiscal-year receipts added by the Revenue Act of 1941. The percentage increase is 38.9. If we apply the same percentage increase to the computed value of c, we obtain a revised figure of 0.306, useful only, to repeat, as a first approximation and probably biased in an upward direction.

If the multiplier m is taken as 2.50, c should have been at least 0.40 for the diminishing-returns argument to hold. With m equal to 3.00 and 3.25, the minimum value of c falls to 0.333 and 0.308. For m above 3.268, the argument seems to possess statistical validity with a c of 0.306.

In conclusion, then, the diminishing-returns doctrine neither gains nor loses in validity by conversion from its direct to its more subtle and indirect form. But to close on a note of warning, the question of its invalidity turns on transient statistical evidence, not on immutable scientific law. We may be approaching a danger point—and Britain may have already reached it—where indirect diminishing-returns do hold, with all their consequences of fiscal, financial, and economic instability.

[22] The figures are reprinted in the Secretary of the Treasury's *Annual Report* for 1940, at p. 147.

COLLECTION OF THE PERSONAL INCOME TAX AT THE SOURCE

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THE proposal of the United States Treasury Department to withhold taxes at the source from wages, salaries, and investment income has aroused widespread debate over the merits of such a scheme. That such reform in the administration of the income tax seems to be in order is attested by the steps taken in this direction by other countries.

The manifest advantages of this collection procedure should be carefully weighed against the new problems engendered by its introduction before any conclusion can be made of its superiority over present collection methods.[1]

EXPERIENCE IN FOREIGN COUNTRIES

Germany was first among the large countries to adopt the device of collection at the source as a permanent feature of its personal income tax in the immediate post-war period.[2] In the Commonwealth of Australia the state of South Australia first introduced the stamp-collection plan in 1931, and Victoria shortly thereafter followed its example. New South Wales, Queensland, and Western Australia have all instituted wage-deduction schemes more like our own social security deductions under the old age and survivors insurance program.[3] In Canada the province of British Columbia has since 1931 levied a tax at the source

[1] This study was begun as a part of a broader investigation into the financing of national defense under a grant of funds to the Institute of Public Administration by the Carnegie Corporation of New York. The author is indebted to Dr. Carl Shoup and Dr. Milton Friedman for their helpful suggestions and criticism.

[2] For an excellent description and evaluation of the German experience see H. G. Dobriner, "An Outline of Germany's Experience in Taxing Persons with Small Incomes," *Bulletin of the National Tax Association*, December, 1939.

[3] The best available account of the Australian experience is found in Paul J. Strayer, *The Taxation of Small Incomes* (New York, 1939).

of 1 per cent on all income over fourteen dollars per week;[4] and the province of Manitoba has had a wage tax deducted at the source for several years.

More recently, introduction of this procedure was accelerated by the necessities of war finance. Since 1940 Canada, England, and the Commonwealth of Australia have all introduced a withholding tax. These plans differ significantly with respect to the period in which the tax liabilities are collected. In England and the Commonwealth of Australia the collection-at-the-source technique simply provides a systematic instalment plan for the payment of the tax liability arising in a previous period. On the other hand, Canada follows the German practice of synchronizing the deductions with the income tax liability for the year in which they are made.

Collection at the source has been an important feature of the British income tax system since 1803. With the exception of salaries and pensions paid by the government and the railroads, it has been applied exclusively to investment income.[5]

In 1931 a plan was offered to taxpayers which authorized the deduction of their assessment out of future wages and salaries, but it was little used. With the imposition of severe wartime schedules by the Finance Act (No. 2) of 1940 this plan was made compulsory for wage-earners and salaried workers. Wage-earners are assessed half-yearly on the basis of the earnings reported by the employer for the half-year ending October and April and the annual returns filed in September or October by the employee stating income (from all sources) and allowances.[6] The collector of taxes then notifies the employer of the tax assessment, which

[4] An account of the administration of the British Columbia tax is to be found in Walter W. Heller, "Study of Taxation of Small Incomes and Collection at the Source," printed in *Hearings before the Committee on Finance, U.S. Senate, on the Revenue Act of 1941*, pp. 412–14.

[5] Under this system a company pays the standard rate (now 10s. on the pound) on its profits but withholds this tax on all dividend and interest payments, regardless of the amount. The system is integrated with income tax, however, so that the taxpayer is credited with the taxes deducted from his investment income when his assessment is made.

[6] Although assessment is on a half-year basis, a wage-earner's tax liability depends on his total earnings for the year (*The Taxation of Weekly Wage Earners*, Cmd. 6348, April, 1942 [London], p. 2).

he is required to deduct in twenty-four equal instalments beginning January 1 and July 1 for the preceding assessment period. This is remitted to the collector once a month.

With the Income Tax Assessment Act (No. 2) of 1940, the Commonwealth of Australia adopted a somewhat different mechanism for making these deductions.[7] Its object, like that of England's plan, is to facilitate payment of income tax liability of one year out of the earnings of the next.

On January 1, 1941, deductions were begun for the tax year ending June 30, 1940. In future years they will begin in August, immediately following the close of the assessment period. These deductions are made according to a schedule which will secure full payment of the tax in about forty weeks. The amounts are determined by the size of the wage and the marital and dependent status at the time deductions are made. Thus the tax withheld ranges from 2*s*. for wages between £3 17*s*. and £4 10*s*. per week up to a maximum of 5*s*. per pound for wages of £18 and over. For each dependent the deduction is 5*s*. less each week.

Use is made of the stamp plan, which has been generally adopted by the Australian states for collection purposes. Under this system the employer purchases stamps from the post office to cover the amount of the taxes collectible and issues them to the employees for the amount of the deduction made. At the time of receipt of the stamp the employee is required to cancel it by writing his signature. He then affixes it to a stampbook which is presented to the income tax collector when his liability has been discharged.

The stamp plan is required of all employers with fewer than one hundred permanent employees. Where employment is regular and on a large scale, the alternative "group scheme" may be elected. This is similar to the British system but requires weekly rather than monthly remittance to the local collector of revenue. A supplementary list of employees and their deductions is filed monthly for purpose of record.

[7] *Federal Income Tax-Collection of Tax by Instalments*, pamphlet issued by New South Wales, Commonwealth of Australia, describing for the information of employers the Commonwealth collection plan, which was administered by the states.

Canada provides the most interesting and instructive experience with collection at the source. This procedure was first instituted July 1, 1940, for the National Defence Tax imposed by the Income War Tax Act of 1940.[8] It originally existed as a separate tax on incomes but has now been consolidated with the regular income tax beginning September 1, 1942.[9] Because the collections are made currently from the income payments to which the tax applies, the system represents the most advanced adaptation of the withholding technique to the personal income tax of any nation, with the possible exception of Germany.

The withholding feature was introduced for the collection of the separate National Defence Tax from all wages and salaries, dividends and interest. Unlike the income tax, it was assessed on gross incomes with some progression introduced by the exclusion of individuals earning less than $660 per year and of heads of families earning less than $1,200. The standard rate of tax (between July 1, 1941, and September 1, 1942) was 5 per cent except that *individuals* earning more than $1,200 were taxed at 7 per cent on their entire income. A tax credit of $20 was allowed for each dependent.

Under the revised system the former national defense tax has been combined with the graduated income tax into a single assessment to be collected, so far as possible, at the source. The exemptions of the latter have been reduced in comformity with the former, and the rates of both have been stepped up.[10] Claims for exemption and dependents are filed with employers in duplicate, one copy being forwarded to the district inspector of income tax. Deductions are made in accordance with an elaborate schedule of specified amounts classified by family status and earnings

[8] *National Defence Tax*, brochure issued by the Department of National Revenue, Income Tax Division, Ottawa, Canada, 1941.

[9] *The Budget, Annual Financial Statement of the Minister of Finance: House of Commons Debates, June 23, 1942* (Ottawa, Canada), pp. 3893–3901.

[10] The normal tax preserves the gross-income base which characterized the national defense tax, while the graduated tax is on a net basis. Rates of the normal tax were raised to 7 per cent for married persons and to 7–9 per cent for single persons. The initial graduated rate is now 30 per cent, but this includes an element of compulsory savings refundable after the war (*ibid.*, p. 3894).

range. In the case of investment income, however, no exemption is provided for at the time of payment, the rate of 7 per cent being applied irrespective of the amount.

Remittance is made by the employer on or before the fifteenth of the month following the last pay date or interest or dividend date. Information with respect to name, address, marital and dependent status, wages, etc., is required to be filed once a year before the last day of February.

Where it is not practicable to withhold the tax from incomes a compulsory instalment plan has been introduced. This requires quarterly instalments based upon current tax rates and an income base determined from a previous period with provision for annual adjustment of the balance due for the taxable year.[11]

Overcollections naturally arise when employment is irregular, necessitating provision for refunds. In the past they were granted upon filing a special refund claim or were automatically taken care of at the time the income tax return was assessed.

EXPERIENCE OF THE UNITED STATES

Collection at the source is not new to the United States. The federal government first utilized this device during the Civil War for the collection of income taxes on government salaries and dividends and on interest of certain specified corporations. The income tax law of 1894 provided for the withholding of taxes on salaries of United States government employees earning over $4,000, but the law was declared unconstitutional before it was fully put into operation.[12]

With the reintroduction of the personal income tax in 1913, the withholding plan was adopted for the collection of the normal tax of 1 per cent on interest income and wages and salaries. This withholding provision became unpopular, and in 1915 the Secretary of the Treasury concluded that it would be advantageous to abandon it.[13] The following year the commissioner of internal

[11] For the details of this scheme see the resolutions included in the budget speech, *ibid.*, p. 3911.

[12] E. R. A. Seligman, *The Income Tax* (New York, 1914), pp. 508–18.

[13] *Annual Report of the Secretary of the Treasury, 1915*, p. 19.

revenue recommended that collection at the source be dropped in favor of information at the source. "In the nature of things," he stated, "a taxpayer's normal tax liability is satisfied in part, only, at the source; and the records of the bureau show that for three years during which an income tax law has been enforced, less than ten per cent of the whole amount of the tax was collected at the source."[14] Dissatisfaction on all sides finally led to its abandonment by Congress in 1917.

Withholding at the source is at present practiced by the federal government in collecting taxes on the income of nonresident aliens and foreign corporations. Employers in this country are required to withhold a tax of 27½ per cent on all interest, dividends, rents, salaries and wages, etc., going to these nonresident aliens.[15] All gross incomes up to $23,000 are subject to this rate.[16] Those earning more than this are required to pay the same rates as residents but are entitled to a $1,000 exemption as well as deductions properly allocable to such incomes. In case of failure to file a return the commissioner of internal revenue has power to assess the tax from one or more sources of income in the country without provision for allowances or deductions.

Withholding at the source is also in effect in several states for the collection of taxes from wages and salaries of nonresidents. New York State provides the most important example of this. In 1939 nearly 75,000 returns were filed (Form 102, joint employer and employee cards), and $3,350,000 in taxes, before refunds, was collected.[17]

The Treasury Department has recognized the desirability of withholding taxes on those incomes which are paid periodically. Recommendations were made to Congress to permit the collections of personal income taxes in this manner up to 10 per of the taxable income, after provision for exemptions and credits for de-

[14] *Annual Report of the Secretary of the Treasury, 1916*, p. 674.

[15] *Internal Revenue Code*, sec. 211(a)(1), as amended by the *Revenue Revision of 1941*, sec. 105.

[16] Under the terms of a tax convention with Canada, effective January 1, 1936, the withholding rate with respect to Canadians is reduced on a reciprocal basis and is now 15 per cent (*Internal Revenue Code*, Appen., par. 106).

[17] Heller, *op. cit.*, pp. 411–12.

pendents.[18] This plan contemplates deduction of taxes simply as a means of collection and not as a supplementary income tax. It would follow the Canadian practice, however, in making deductions in prepayment of the year's tax liability rather than providing for the instalment payment of the prior year's assessment. It is believed that the adoption of such a plan would accomplish several recognized improvements over the present technique.

MERITS OF COLLECTION AT THE SOURCE

1. *Convenience of payment.*—It has been the experience of foreign countries that the extension of the personal income tax to the lower-income groups must be accompanied by some systematic instalment scheme for the convenience of the taxpayer. A policy which worked in the past for the higher-income groups can no longer be defended when millions of new workers are brought into the picture by the lowering of exemptions and the burden on the middle-income groups is greatly increased.

Income taxes are properly a charge to the income of the period in which they arise. For this reason sound management of one's personal finances dictates the accrual of taxes out of current earnings. It is questionable, however, whether the majority of individuals consciously budget their current incomes to make provision for taxes payable. Probably the great majority rely on their future earnings (or borrowing) to discharge this liability to the government—a practice which insecurity of employment and income makes extremely hazardous. Compulsory prepayment of income taxes by a withholding tax removes a large element of this uncertainty, secures a better correlation of tax payments with income received, and thereby eliminates the objection to a serious discrepancy between the tax liability and liquidity which may exist under the present system.

This consideration is closely bound up with another aspect of deduction at the source: the taxpayer does not have the same consciousness of parting with his income to the government that

[18] *Statement of Randolph Paul, Tax Adviser to the Secretary of the Treasury, before the Ways and Means Committee of the House of Representatives: Treasury Release,* March 3, 1942.

characterizes the present lump-sum payments. That deductions from wages and salaries are the most "painless" method of meeting tax liabilities is attested by the favorable reaction of workers in England, Australia, and British Columbia to deduction at the source as well as by the experience in this country with the social security deductions.[19] It is understood that the reception in Canada has been most favorable.

This convenience, of course, is not an unmixed advantage if tax consciousness is considered important. But since the deductions are not concealed, much can be gained by making increased taxes more palatable in this respect.

2. *Evasion and underreporting.*—Another important factor that gives support to collection at the source is that the opportunities for evasion are reduced to a minimum. Not only do the reports required to be made under the deduction system fulfil the purpose of the present information reports but additional responsibility is put on the employer for the collection of the tax. This is achieved by holding the employer legally liable for the payment of taxes due by the employee and imposing severe penalties for failure to comply. Moreover, the burden of proof of tax liability is put more squarely on the taxpayer in the requirement to file an exemption certificate and claim for refunds. In this way many thousands of workers deriving their income from more than one employment would be caught. Finally, it should be easier to enforce the collection of the tax from a more limited number of business units than from the vast number of potential taxpayers themselves.

Certainly a better check would be provided on investment incomes if the taxes were withheld from all dividends and interest as in Canada. The prevention of evasion is considered one of the paramount advantages of the British system of collecting taxes on investment incomes. The British Royal Commission on the

[19] The results of a survey conducted by the *Los Angeles Times* during August, 1941, disclosed that a majority of the men interviewed favored withholding of income tax from wages and salaries (see H. A. Strangman, "Withholding Income Tax from Pay Checks," *Taxes*, December, 1941, p. 721). The early Australian experience is reviewed with satisfaction by T. Hytten, "Collecting Income Tax at the Source," *Economic Record*, December, 1932, pp. 278–81.

Income Tax of 1920 held: "We are convinced that to abandon taxation at the source now would involve an enormous loss of revenue and would throw upon scrupulous, honest and careful taxpayers an unfair share of the burden imposed by taxation necessary for the country's needs."[20]

3. *The revenue lag.*—The effectiveness of the personal income tax as an instrument for the control of inflation is considerably impaired by the present collection system. Payment of taxes on 1941 incomes, for example, is not completed until the end of 1942; the first two instalments are paid in the fiscal year ending June 30, 1942, and the last two instalments fall into fiscal 1943.[21] There is thus a lag averaging one year between the period during which the taxable income is earned and the receipt of revenues by the government.[22] A much quicker response of the revenue system to the rapidly changing necessities of war finance could be achieved by collecting these taxes, in part at least, at the source.

A compensatory fiscal policy based on the use of a withholding tax may take several forms. A major question of policy immediately arises as to whether it should be incorporated within the structure of the present income tax or whether it should exist independently as a supplementary tax. While a supplementary tax possesses the virtues of greater administrative simplicity and flexibility in rates and exemptions, it is questionable whether such expediency sanctions duplication of the present income tax system.[23]

The Treasury's plan is an adaptation of collection at the source to the present income tax system. While it does not eliminate the present lag in tax collections, it does secure a substantial prepay-

[20] Quoted by G. Findlay Shirras, *Science of Public Finance* (London, 1936), p. 493.

[21] In the calendar year 1940 these first two instalments amounted to 62.8 per cent of the tax liability for 1939. The balance was paid in the last six months of 1940 and was allocated to the 1941 fiscal period.

[22] It is doubtful if the purchase of tax-anticipation certificates by individuals has materially altered the effect of this lag. By March 31, 1942, individuals had purchased only $300 million in value of Tax Series Treasury Notes, Series A and B (*Bulletin of the Treasury Department*, April, 1942, p. 38).

[23] Cf. Harley L. Lutz, "A Tax on Gross Income Payments to Individuals," in *Financing the War* (Philadelphia: Tax Institute, 1942).

ment of taxes which are credited against the income tax assessments when they fall due. Since collections would be made concurrently with the payment of existing liabilities in the transition year, during this period of time they serve the end of combating inflation. In future periods more effective use can be made of the machinery by adjustment of the withholding rate to the changing demands of the time.

Administrative simplicity dictates the use of a flat rate rather than progressive rates for withholding purposes.[24] Where opportunity is provided for annual equalization, a complex rate schedule is not essential. A modest rate of, say, 10–20 per cent for deduction purposes could be incorporated in the regular income tax schedule itself as the minimum surtax rate, for the purpose of minimizing refunds.

LIMITATIONS OF COLLECTION AT THE SOURCE

Despite the strong case that can be made for instituting collection at the source in the United States, the Treasury plan would be confronted by considerable administrative difficulties. While these difficulties would be greatly minimized by a tax on gross incomes, they are not too great a price to pay for the maintenance of progression in the tax system.

1. *Coverage and yield.*—The effectiveness of collection at the source is a function in large part of the size of the income tax base which it embraces. It is important, therefore, to examine the potential coverage and probable yield of the plan.

If government employees, a part of salaried professional workers, and railroad employees are added to the workers now included within the old age and survivors insurance system, there would be brought in about 95 per cent of all wages and salaries paid in the United States.[25] This amounts to almost 62 per cent

[24] Where graduated rates are employed it is necessary to employ tables of specified amounts of tax for income ranges at different income levels for different dependent classes as in Canada (see the *Montreal Daily Star*, August 15, 1942, for the Canadian schedule of tax payments). Germany has employed progressive rates with acknowledged success (Dobriner, *op. cit.*, pp. 76–77).

[25] The above data were derived from the *Survey of Current Business*, June, 1941; *Old Age and Survivors Insurance Statistics: Employment and Wages of Covered Workers, 1938* (Washington, 1940); *Social Security Bulletin*, May, 1941.

of the national income. The addition of net dividends and interest paid out to individuals would raise this to a total of about 74 per cent of the entire national income payments.[26] This should be reduced for tax-exempt interest on federal, state, and municipal bonds; interest on savings deposits; dividends on co-operative loan associations; and coupon bond interest.[27]

It is probable that the nonagricultural proprietorship and partnership incomes would be the principal incomes missed. Individuals of this group are predominantly of the higher-income classes, whereas the incomes of agricultural workers and domestics fall into the lower ranges and would not for the most part be subject to the income tax.

Since these entrepreneurial incomes would by their very nature escape the withholding net, some practicable scheme should be adopted that would achieve the same effect. For this purpose the newly adopted Canadian plan could be instituted (see p. 723). The Treasury proposal of requiring these individuals to pay one-half instead of one-quarter of their tax in March may serve equally well.

The Treasury Department estimates that a 10 per cent tax would bring in approximately $2.5 billion for a full calendar year under the newly proposed exemptions.[28] It is interesting to compare this estimate with the collections in Canada between April 1 and December 31, 1941, amounting to $68,709,059, at an annual rate of $92,000,000.[29] This would be equivalent to over $1.2 billion in the United States on a strictly population basis.

2. *Exemptions.*—Providing for exemptions presents one of the most troublesome problems in making deductions of this sort.

[26] The principal income groups excluded are (1) those receiving rents and royalties (2.8 per cent) (although it should be possible to make deduction from royalties, rents for the most part present insuperable difficulties); (2) net income of unincorporated business, including agriculture (6.6 per cent) and "other" (9.8 per cent); (3) professional workers, agricultural workers, and domestic servants (5–6 per cent) (*Survey of Current Business*, June, 1941, p. 17).

[27] *Statement by Randolph E. Paul on the Administrative and Compliance Problems Involved in Collection at the Source: Treasury Release*, August 22, 1942.

[28] *Income Tax Collection at the Source: Treasure Release*, May 20, 1942.

[29] Letter to the writer from C. F. Elliott, commissioner of income tax, January 8, 1942.

Although the Canadian experiment has been successful in this respect, the plan contemplated by the Treasury Department is even more ambitious since the deductions are planned on a net rather than gross basis. According to the suggested procedure, the tax would be withheld on "the excess of wages and salaries over the taxpayer's personal exemption, credit for dependents and a fixed percentage of such exemptions and credit representing an average allowance for deductions."[30] These amounts would be prorated over the pay-roll periods of the employee upon his filing an exemption certificate for his family status. Thus a married man with one dependent would be exempt from the withholding tax on a weekly income of $34.50 under the proposed limits.

A different situation is confronted in the exemption of those with investment holdings in a number of different corporations. Because of the administrative difficulties involved, it would be practicable to withhold the tax on dividends and interest on a gross basis. Such discrimination could be avoided, however, where such incomes provide the principal means of support by the issuance of nontransferable exemption coupons up to the amount of exemption claimed. These would authorize the payment of interest and dividends in full when submitted to the corporation or paying agent.[31] The handling of these coupons would not present any difficulty, since the number of individuals with pure investment incomes below the level of exemptions is probably not very large.[32]

The greatest part of investment income is earned by those with other sources of income as well. In 1936, 44.2 per cent of the income tax returns showed income from more than one source.[33] Those reporting wages and salaries in combination with interest,

[30] *Statement of Randolph Paul: Treasury Release*, March 3, 1942.

[31] Subsequent Treasury proposals embody this idea (*Income Tax Collection at the Source, op. cit.*).

[32] For 1936 only approximately 150,000 returns showed income exclusively from investment, dividends, and trusts, out of a total number of 5,286,708 individual income tax returns filed (U.S. Treasury Department, *Statistics of Income: Supplement Compiled from Income Tax Returns for 1936*, Sec. III, Tables 1, 2, 3, and 4).

[33] *Ibid.*, p. 2.

dividend, and fiduciary income comprised only 15.8 per cent.[34] No special investment exemption would be required for most of these taxable individuals, since this would be taken care of by the exemption filed with the employer. Where the wage or salary is less than the exemption permitted, additional complication is introduced; but where the investment income can be shown to be only supplementary, the privilege of using investment-exemption coupons can be arbitrarily denied.

3. *Annual equalization.*—If collection at the source is integrated with the regular income tax, provision for rebates and additional assessment for surtaxes would have to be taken care of annually. It would be necessary for everyone taxed at the source to file an annual return, if taxable, or a special claim for refund if annual wages were below the exemptions and allowances made. A return could be devised which would automatically provide for refunds on the basis of the return itself, after it had been properly audited. This would entail a revision of the present law respecting refunds, since the present process would be too time-consuming in dealing with necessitous cases. The Treasury Department plans to expedite the payments of refunds on accounts of less than fifty dollars by granting them immediately on the presentation of receipts for taxes deducted.[35]

Except in unusual cases of hardship, no serious obstacle is imposed on collection at the source by reason of the necessity for refunds and adjustments. In fact, it may be preferable to overtax than to incur the additional expense of enforcing the collection of small liabilities due. Moreover, the refunds due may in most instances be looked upon as a windfall or savings account and could be exchanged for war stamps or bonds.

The experience of Canada with refunds throws some light on what can reasonably be expected in this country. While refund claims were still coming in for taxes deducted in the calendar year 1940, the number of claims made between April 1 and December 31, 1941, amounted to 26,002 and the amount refunded was

[34] *Ibid.*, Table 3.

[35] *Income Tax Collection at the Source.*

$158,563.97.[36] Despite the low volume of these claims, it is recognized in Canada that refunds do represent administrative problems. These arise primarily from the necessity of collating the great number of reports received from employers for the payment of wages, salaries, dividends, and interest and bringing them together under the name of each taxpayer in the several district offices so that the claim for refunds can be approved. This difficulty would be magnified in this country by reason of its greater size, the widespread ownership in corporations, the large turnover of employment and migration of workers, as well as the more complex exemption system proposed.

Additional difficulties may arise under either system in the exclusion of business and nonprofit corporations as well as other tax-exempt associations. Adequate data are not available for interest payments, but statistics for 1937 show that about 35 per cent of the stock of all American corporations was owned by other domestic corporations, about 1 per cent by nonprofit institutions, and 2–3 per cent by foreigners.[37] Over 60 per cent was owned, therefore, by individuals and trust estates, about 20 per cent of it being registered in the names of brokers.[38] The paying corporation could be required to withhold the tax not only from dividends owned by these individuals, estates, and trusts but also from the nominees (brokers, etc.) as well. In the case of corporate and institutional ownership no deduction need be required.

4. *The "cost of compliance."*—Strong objections have been voiced by employers against the additional burdens thrust on them in collecting the tax. It will be necessary for them to handle each employee's account separately in order to calculate the tax due; give the proper receipt; make the required quarterly remittance; and report yearly on each individual to the local collector of internal revenue. The precedent of social security deductions should pave the way for the introduction of such a sys-

[36] Letter to the writer from C. F. Elliott, commissioner of income tax, January 8, 1942.

[37] *The Distribution of Ownership in the 200 Largest Nonfinancial Corporations*, T.N.E.C. monograph No. 29, p. 9.

[38] *Ibid.*

tem, and the additional work could largely be spread over the present personnel engaged for this task. In essence the work involved would not be difficult where the exemption is expressed in terms of weekly or monthly pay. This amount is simply subtracted from the wage and the rate of tax applied to the balance.

The vexations experienced by employers and collection agents were largely responsible for the hostility to collection at the source before its abandonment in 1917.[39] The major charge that the revenue derived was out of any reasonable proportion to the expense involved in its deduction should not be valid under the projected lower-exemption levels and higher tax rates as compared with the $3,000–$4,000 exemptions and the normal tax of 1 per cent in effect during that early period.

Although the cost of administration is, undoubtedly, a factor that is in the minds of employers in Canada, it is understood that their co-operation has been splendid. In this country the principal protests have arisen from banks which act as fiscal agents, since they are not equipped to handle the volume of work required in giving receipts for taxes deducted from interest and dividends or for making periodic reports to the government. The response of industry in general has been favorable. Of 454 employers interviewed by the Treasury Department, 88 per cent were favorably disposed and only 6 per cent definitely opposed (*Statement by Randolph E. Paul*, August 22, 1942).

5. *The administrative problem.*—Many phases of the additional burdens placed on the government have already been indicated above. It is clear that the feasibility of collection at the source depends in major part on the ability of the Bureau of Internal Revenue to cope with this enormous and complex job for which it is not at present adequately prepared. While the Bureau has emphasized the administrative difficulties of the procedure, it has agreed that the plan is administratively practicable.[40]

With the lowering of exemptions to $1,200 and $500, over thirty-one million returns are anticipated in 1943, of which twen-

[39] Mortimer L. Schiff, "Some Aspects of the Income Tax," *Annals of the American Academy of Political and Social Sciences*, March, 1915, pp. 21–24.

[40] *Statement by Randolph E. Paul*, August 22, 1942.

ty-seven million will be taxable.[41] This unprecedented volume in itself imposes a tremendous burden on the Treasury. For the purpose of administering the withholding tax an additional force of 11,000 is estimated to be required,[42] as well as office space, typewriters, and machines which will be difficult to obtain under present conditions.

As the income tax is extended to the masses, collection is undoubtedly better assured by the withholding device in those areas where there would be an increased likelihood of its breaking down. The reduction of these exemptions, however, impinges on the floating population moving from job to job and adds cumulative burdens in the segregation of their deductions to one central point in the district of taxation.

A major job is one of keeping these records of the amount of taxes remitted by employers. There appears to be no necessity of the government's keeping a monthly (or quarterly) file for each employee or recipient of investment income. For this purpose the Canadian requirement of an annual detailed report to be made by each withholding agent should be sufficient. This would take the place of the present information return but would report as well the taxes deducted from each payee. The Treasury intends to use the exemption certificate for this purpose.

With respect to the administration of a withholding tax, no net advantage would be realized by the adoption of a stamp plan.[43] The employment of this system would not obviate periodic reports of employers, since these would be essential to enforcement of the tax. Strict accountability to the government is better insured also by an annual pay-roll summary which should support the reports of remittances made of taxes deducted throughout the year. This would, in addition, constitute an information return necessary for the auditing of annual income tax returns and refund claims.

The use of stamps as an evidence of payment of the tax would

[41] U.S. Senate, *Hearings before the Committee on Finance*, July 23, 1942, p. 19.

[42] *Statement by Randolph E. Paul*, August, 22, 1942.

[43] Cf. Walter W. Heller, "Collection Methods Appropriate to the War Time Use of Income Taxes," in *Financing the War* (Philadelphia: Tax Institute, 1941).

only be nominal since the employer's information report would constitute the final record. It is significant in this respect that the Commonwealth of Australia has adopted an optional group scheme for the benefit of large employers as a departure from the stamp plan which has become institutionalized in that country.

6. *The problem of transition.*—Since collection at the source must be imposed at a time when large income tax liabilities for the preceding calendar year remain unpaid, special consideration must be given to the burden of superimposing one year's tax upon another. In principle the best time to initiate such a program is when a serious threat of inflation seems imminent. With a purely supplementary tax designed to control inflation there would be no transition. Perhaps the major virtue of the withholding tax of 10 per cent at the present time is that it will advance by one year the collection of $2.5 billion in revenue. In view of the serious threat to maintenance of a stable price level represented by the rapidly rising excess purchasing power it is imperative that collection be begun as soon as possible.

Any compromise represented by initially lower rates than the originally proposed 10 per cent would obviously lighten the taxpayers' burden but would at the same time jeopardize one of the principal objectives of the plan.

The Ruml plan purposes to put taxpayers on a current basis by the simple expedient of canceling a year's taxes. Since the only tax paid currently would be a tentative tax based on the prior year's income, it is obvious that pay-as-you-go is achieved in name only. The Treasury Department has suggested how collection at the source could be linked to this plan without retaining the objectionable features of the original Ruml proposal.[44] Under this modification only the normal and first-bracket surtax rates of 4 and 6 per cent on all taxable income would be canceled, and these would be replaced by a withholding tax in 1943 of 6+13 per cent, the corresponding rates in the pending revenue bill. This compromise is ingenious, but the difference in the net

[44] *Statement by Randolph E. Paul on Ruml Plan: Treasury Release*, August 24, 1942.

effect on the taxpayer between these rates and the original 10 per cent recommendation is negligible.

7. *The incidence of the tax.*—Until recently little attention has been paid to the incidence of taxes on wages.[45] In the light of the greatly enhanced taxes on pay rolls contemplated by Congress much more consideration should be given to the repercussions of such taxes, not with regard to their incidence alone but to their economic effects as well. To the extent that wages are maintained at the levels which would have prevailed had there been no tax, the incidence of the pay-roll deductions will be borne by labor. Of even greater importance to the war effort is the effect of the taxes on production. Should incentives to produce be impaired by a check-off system, little would be gained by the device.

The institution of a plan for collection at the source must secure the co-operation of labor for its successful administration. That considerable reliance can be placed on patriotic motives to secure this result is evidenced by the favorable reaction of workers in Canada, where there has been no apparent pressure to increase wages by reason of the tax. In this respect it should be recalled that one of the principal purposes of prompt collection is to forestall the evils of inflation. Whereas the incidence of inflation is more or less indiscriminate in its effect on families in different income groups, progressive taxation of incomes is designed to apportion the burdens of war more equitably.

It is also important that the worker be fully and clearly informed, not only of the purpose of such a check-off system, but also of his rights and privileges regarding, e.g., refunds, exemptions, deductions, filing annual returns, etc., so that the tax will not be a tax on ignorance.

CONCLUSION

The recent broadening of the income tax base is a recognition of the fact that the greatest additional revenue potentialities of

[45] For a review of contemporary theory see Carl Shoup, *The Prospects for a Study of the Economic Effects of Payroll Taxes* (Washington: Committee on Social Security of the Social Science Research Council, 1941), pp. 23–43.

the income tax lie in the low-income groups. Since the greatest flow of consumer expenditure is also be be found within these lower ranges, the tapping of these sources is most effective in siphoning off excess purchasing power.[46] Besides providing the most convenient method of paying these taxes, with a minimum of evasion, the introduction of collection at the source now would serve most appropriately in capturing this income before it is spent.

The partial-prepayment plan proposed by the Treasury appears to be the most practicable adaptation of the withholding feature to our personal income tax system. The recent unification by Canada of their dual income tax system confirms the view that nothing is achieved by a supplementary tax which cannot be accomplished within the scope of the regular income tax. The revised Canadian plan, however, promises to accentuate the refund problems which can be mitigated by our flat rate. Although the German system is similar in many respects, the elimination of refunds has introduced undesirable inequities. So little is to be gained by following the British and Australian examples that a trial in this country is not warranted.

Whether the compelling merits of collection at the source are outweighed by its increased administrative complexities and costs both to the government and to industry is a question that cannot be categorically answered. Official British reaction to the adoption of a withholding tax based on current income was unfavorable.[47] On the other hand, satisfaction with its success in Canada is evidenced by the greatly increased role it has been assigned to play in collecting ultimately 85–90 per cent of the personal income tax liability.[48]

[46] In 1935–36, 88.6 per cent of the aggregate outlay for current consumption was made by those with incomes below $5,000 (National Resources Committee, *Consumer Expenditures in the United States* [1939], p. 48).

[47] Besides the difficulties described above, the objections reflected in large part the attachment to the traditional assessment system and to the principle of nondisclosure to the employer of one's personal circumstances. Probably the principal objection, however, was the problem created by overcollection and refunds (*The Taxation of Weekly Wage Earners*, pp. 6–10).

[48] *The Budget*, p. 3899.

UNSTABLE CONDITIONS OF COMPETITION AND MONOPOLY IN EXHAUSTIBLE RESOURCE INDUSTRIES

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IN EXPLORING the notion that there is a large region between the extremes of monopoly and competition, economic theory has made progress in explaining the economic world, but it has not freed itself from thinking too exclusively of monopolistic problems, or of competitive problems, or of problems with certain and constant admixtures of monopoly and competition. The typical hypothesis allows little place for the possible change from one type of operation to another as a consequence of the relevant factors of price and quantity studied. The transition has not been made from theory to the actual experience of our present-day industries, typically composed of several large firms and many small ones in which structural characteristics are constantly changing.[1] This paper examines an aspect of this by considering the forces behind the changing structure of exhaustible resource industries which make them at times competitive and at other times monopolistic.

The importance of this problem was observed in a study of recent developments in the anthracite coal industry.[2] Since 1927 this industry has been losing much of its market, while within the industry itself important changes in production and control as between the large "line" companies and the "independents" have been taking place. While the industry dropped in production from 73 million tons in 1929 to 51 millions in 1939, the line companies' share in the total production decreased from 73.2 to 52.2 per

[1] See the testimony of Willard L. Thorp before the Temporary National Economic Committee, Part I, p. 137.

[2] William R. Pabst, Jr., "Monopolistic Expectations and Shifting Control in the Anthracite Industry," *Review of Economic Statistics*, XXII (1940), 45.

cent. While the industry and the line companies were losing tonage rapidly, the independents, many of them small, competitive, and unorganized, were gaining in absolute tonnage and gaining rapidly relative to the rest of the industry.

In the analysis of these developments, the theory of monopolistic competition seemed at first to offer a solution. Restriction on the part of the monopolistic side of the industry and expansion on the part of the competitive seemed easily answered on the basis of the accepted theoretical developments. But the situation was not so simple. The individual competitors in general acted no differently than the monopolists; the great mass of small independents, in contrast to the large *new* independents, did not increase their total production significantly. Differences in price policy as between the competitive and monopolistic parts of the industry, which seemed to explain satisfactorily the broad shifts in the industry, proved to be an insufficient explanation of the action of the individual companies. Nor was the invasion of the line-company markets by the independents with trucks and newly developed means of transportation found to be of significant importance. The strategic factor in the situation clearly appeared to be the great changes in the investment value of the unmined coal reserves, whose changing value reflected the expected situation of future demands for coal.

The influence of changing demands helped to explain the unification of the industry in the hands of the "anthracite monopoly" as well as its disintegration.[3] This monopoly, arising from the active co-operation among the line companies, was shown to have been erected on the hope of an ever increasing demand for coal and the consequent increasing rent on coal reserves. In the building of the industrial structure, the large companies at times seemed willing to acquire as many reserves as possible at whatever price they had to pay. The sudden downturn in the demand for coal, first felt in the 1920's, reversed the centripetal forces that had produced the combination in the industry. The line companies changed from a policy of building up reserves to one of

[3] Eliot Jones, *Anthracite Coal Combination in the United States* (Cambridge, Mass., 1914).

getting rid of as much of their reserve as they profitably could. New large independents, working mines leased from the line companies, appeared in the industry. They accounted for the great increase in independent production and the shift from the monopolistic to the independent part of the industry.[4] These *new* independents who could shade prices and invade old markets or find new ones by means of trucks were apparently willing to take over the coal reserves of the line companies and exhaust them as quickly as possible, whereas the producers formerly in the industry, both large and small, with their fixed markets and with their conventions against invading the territory of the others, apparently could not increase production in any way available to them. The expected competitive action on the part of independents came only from those who purchased coal reserves cheaply. The obvious conclusion followed that monopoly in the industry, built on expectations of profitable investment in coal reserves, appeared to be disintegrating as those expectations failed to be realized. The structure of the industry as between the monopolistic and competitive groups depended upon the future of expected demand.

That these conclusions had importance beyond the anthracite industry was apparent. It will be shown that they apply to exhaustible resources in general, and to other industry as well. Whether advancing industries which have expectations of increasing demand for their products tend to monopoly or some variant of monopolistic combination and whether industries of declining demand experience intense and cutthroat competition will be discussed.

The essential element in the relation between the investment value of resources and the changing structure of industry is connected with the reasons why one group in an industry has an

[4] In the annual report of the Pittston Co., reported in the *New York Times*, April 23, 1940, J. P. Routh, the president, stated that "properties of most of the subsidiaries were newly appraised and properties found to have no present or future equity were abandoned, reducing carrying charges substantially. The anthracite mines of the company which were leased from the Pennsylvania Coal Company were turned back to that company and the leases cancelled under a readjustment plan. By this action the company saved $762,228 in 1939, compared with 1938."

incentive for sale at the market price and another group the incentive to purchase resources. Obviously this is a matter dependent upon the discounted present value of the expected future returns. When this discounted value varies from one person or one firm to another, sales might be expected. But when there is consistency in the direction of sales from the organized to the unorganized group in one industry, the underlying implication is that there exists a basic reason for differences in expectations.

This suggests that the sales of resources by a monopolistic group are part of the problem of premature abandonment. Caplan has investigated this problem in order to generalize the conditions under which machinery might be abandoned or replaced by other equipment before it had served its accounting life.[5] Any durable asset, of course, might be considered as machinery. Since the value of a durable asset is given as

$$V(t) = \int_t^T [x\,Y(\gamma) - O(\gamma)]\, v^{\gamma-t}\, d\gamma + S(T)\, v^{T-t},$$

the condition that present value is maximized may be taken as

$$x\,Y(t) - O(t) = \delta(t) S(t) - S'(t),$$

where $V(t)$ is the value of the asset at time t, x the cost of a unit of product, $Y(t)$ is the rate of production, $O(t)$ the annual operating cost of the machine, δ is the force of interest, v the discount factor, $S(T)$ is the scrap value, $\delta(T)S(T)$ is the interest of the scrap value, and $-S'(T)$ is the rate of depreciation of the scrap value.[6] Caplan designates the rent of the machine $xY(t) - O(t)$ as an "abandonment rent" when it no longer suffices to pay the interest on and the depreciation of the market value at the end of the period. For an exhaustible resource, maximization of its value depends upon the net return from current operations being greater than the decrease in capital value and the capital charges. If net returns are positive, they must be sufficiently large to cover

[5] Benjamin Caplan, "The Premature Abandonment of Machinery," *Review of Economic Studies*, VII (1940), 113.

[6] This follows the formulation given in Harold Hotelling, "A General Mathematical Theory of Depreciation," *Journal of the American Statistical Association*, XX (1925), 343.

the interest on sale price and the expected decrease during the period. Hence, possible differences in the rate of production and in operating costs as between one firm and another are suggested as the crucial factors in their different estimation of a given market price. A firm unafraid of spoiling the market by expanding operations would find a given machine more valuable than a firm which deemed it wise to restrict its operations below possible capacity. This is a matter of the reaction of individual firms in a segmented industry which will be considered later.

In his paper on exhaustible resources, Harold Hotelling extended his consideration of depreciation to those problems in which possible variation of production might be one of the factors in determining the value of the machine. He explained that "the owner may voluntarily run the machine at less than full capacity, and wishes us to tell him just how fast to let it run in order that his profits be a maximum. The demand function must be known to give such a solution."[7]

This analysis is concerned with the accounting life of the resource, not only under the assumed conditions of prices, scrap values, and replacement costs, but also under varying prices dependent upon the quantity that the entrepreneur decides to put on the market. The entrepreneurs are supposed to act in order to maximize the present values of all their future profits. The interest rate at which these calculations are made is assumed to be unchanging in the entrepreneurs' estimation of future policy, although account might be taken of changes *ex hoc* with an extension of the reasoning along the lines followed by the Caplan analysis of depreciation. The quantity of the resource is supposed to be known.

The determination of the most profitable rate of operations depends here, as elsewhere, on the marketing situation within the industry. Under the condition of perfect competition the problem of the mine owner is to exhaust the mine in an optimum length of time and to decide on the appropriate rate of exploitation at each time, under the given market prices. Likewise, the problem of the monopolist is to choose the rate of production and the price

[7] *Ibid.*, p. 351.

for the product, and thus the appropriate length of time in such a way as to maximize the present value of the future incomes over cost. Hotelling finds that the competitors have the incentive to exhaust the resource at a rate faster than that of the monopolist, since "monopolistic exploitation of an exhaustible asset is likely to be protracted immensely longer than competition would bring about or a maximizing of social value would require. This is simply a part of the general tendency for production to be retarded under monopoly."[8]

The monopolist endeavors to maximize the discounted profit of the exhaustible resource extended over the optimum time of operations. This may be given by the expression that the discounted profit

$$= \int_{t_1}^{t} p q \, e^{-\gamma t} \, dt = \text{maximum} ,$$

where γ is the rate of interest appropriate to the problem, q is the current rate of production, and p is the price. The solution of this depends upon the character of the demand curve relating p with q and the other relevant factors. Hotelling supposes that the demand curve for the exhaustible resource is of the form

$$p = a - \beta q - cx + gt ,$$

where x is the amount that has been extracted from the mine, that is,

$$x = \int^{t} q \, dt \text{ or } x' = q ,$$

and where t is the factor of time. Thus p is a function of x, q, and t, and the problem is one in the calculus of variations. The expression for the maximum present value of the profits and for the appropriate length of time can be found with the help of this branch of mathematics. By giving quantitative meaning to the demand curve, the corresponding values of the solutions can be found. In the example posed in Hotelling's paper, $a = 100$, $\beta = 1$, $c = 4$, $g = 16$, and $a = 10$, where the value of a is given by the terminal conditions that $x = a$, $q = 0$, at the time T of total exhaustion. By substituting these values, the appropriate

[8] Harold Hotelling, "The Economics of Exhaustible Resources," *Journal of Political Economy*, XXXIX (1931), 152.

length of time of operation for the monopolist was found to be 0.93 units of time or about 23 years and 4 months.[9] By extending the analysis, the quantitative value of the discounted profits can be found to be 860.09 units of value.

This equation provides a convenient way for studying the effects of expected shifts through time of the demand curve, the factor found to be so important in the anthracite industry. Accordingly, the numerical example suggested above was solved for different values of g. A positive g suggests that the demand curve for the product is shifting through time to the right—that is, the whole demand schedule increases with the progress of time. A positive g might be the result of increasing population, the exhaustion of substitutes, or an upward secular change for whatever reason in the habits and tastes of consumers for this particular commodity. Contrariwise, a negative g would suggest the development of substitutes or other conditions so that the direct effect of the passage of time would be to decrease rather than to increase the price. Thus when the demand curve is given as $p = 100 - q - 4x + 8t$, the appropriate length of time for the realization of maximum present value was found to be 0.91 units of time as contrasted with 0.93 when g was given as 16. When g was given as 0, -8, and -16, the corresponding time of exhaustion was given as 0.89, 0.87, and 0.79 units of time. Thus changing g from 16 to -16 involved a reduction in the length of operation from 23 years 4 months to 19 years and 10 months. Thus under the conditions of demand assumed, the change in g cannot be said to have a large effect on the decision of the entrepreneur. Nevertheless, the tendency, as g becomes smaller, to decrease the optimum time is unmistakable.

Changes in g, however, have differing effects dependent upon the character of the demand for the product. It was discovered that for the demand curve,

$$p = 100 - q - 2x + gt\,,$$

the value of T runs from 0.84 of a time period to 0.74. For $g = 16$, $T = 0.84$; for $g = 8$, $T = 0.81$; for $g = 0$, $T = 0.79$; for $g = -8$,

[9] *Ibid.*, p. 156.

$T = 0.76$; and for $g = -16$, $T = 0.74$. Obviously, changes in the value of g have more effect on the appropriate length of operation for the monopolist when the effect on price of accumulating stocks is reduced. Under these conditions the monopolist has the incentive to produce more rapidly than when the effect on price of accumulating stock is great.

Similarly, the effect of changes in g is widely variable for different demand curves. For a more elastic demand curve, say

$$p = 100 - 2q - 4x + gt,$$

we expect the monopolist to extend his time of operations, and under this condition we find that changes in the value of g have a less important effect.

For a less elastic demand, where the coefficient of q is $\frac{1}{2}$, we expect the reverse to be true, and hence that the monopolist tends to exhaust the mine with greater speed. In this case the effect of changes in g would be greater. The conclusion that necessarily follows from these different equations is that changes in the expectation of the future lead to no single reaction on the part of mine owners. Rather, such changes are part of the whole structure of all the factors involved. The influence of these changes in g depends upon the given values for the other factors. Although we can say that shifts in demand from high values of g to lower values produces a corresponding incentive on the part of mine operators to increase the speed with which they plan to exhaust their resources, the estimation of the force of changes in g depends upon the other factors involved. As the demand curve for the product shifts to the left with the passage of time, or as the aspects of the future appear to grow gloomier to the monopolist, he tends to hasten the rate of extraction and to exhaust the mine at a quicker rate. How much quicker depends upon other conditions given in the problem.

If changes in g affect the monopolist in such a way, how do such changes affect the competitors? Do they, too, have a tendency to hasten production and exhaust the reserves sooner? Indeed, we have seen that the competitors tend to exhaust the mine more quickly than the monopolist. For the conditions of demand

given by Hotelling, he found that the competitors will find the optimum time until exhaustion to be 0.67 as compared with 0.93 for the monopolist.[10] The effect of competitive conditions is similar to decreasing the elasticity of the demand curve for the product. As the optimum time to exhaustion decreases under other conditions of demand, the spread between the competitive and the monopolistic time decreases. Since the difference in the value of the resource for the competitor and for the monopolist depends in large measure on the difference between the length of operations under the two situations, the advantage of monopolistic operation over competitive operation decreases. Nevertheless, it is apparent that the value of the total resource for competitive operation never exceeds, under the conditions stated above where a positive price above costs exists, the value for monopolistic exploitation. Changes in g, therefore, change only the relative attractiveness of monopoly over competition.

The decreasing spread between the value of resources under competitive and monopolistic operation as the demand curve shifts downward through time provides a partial explanation of much of the change in the industry. What is important to note is that this comparison is between the whole industry under monopolistic conditions and the whole industry under competitive. What it shows is that the capitalized values of the resources is never greater under competitive conditions and that the spread between them varies widely. In order to be more realistic, this comparison of the evaluation of the entire industry under the different hypotheses should be modified to consider the relative valuations on the part of the policy-forming groups within the industry—that is, on the basis of individual firms or groups of firms.[11]

[10] *Ibid.*, p. 159.

[11] This question of differential interest rates has been summarized by Harold Hotelling in personal correspondence: "A higher interest rate leads to a shortening of the theoretical time until exhaustion either under monopoly or under competition. Hence it might be expected that the big companies, with their readier access to the capital market, would hold on to their unmined coal longer than small concerns which pay higher interest rates for their capital. That the reverse seems to be true calls for explanation. The explanation may lie in the small newcomers' being self-

Although no attempt is made here to carry through such a mathematical analysis on the basis of individual firms, it is apparent that the demand curves for the output of the individual competitive firms would be more elastic than those for the rest of the industry. For these the influence of changes in g would suggest a more rapid rate of exploitation as future expectations worsened. Shifting in an industry is, of course, predicated upon the case in which complete and permanent horizontal combination in the industry is not the starting-point, for in this case there would be little possibility of the monopolist giving away his power to other firms no matter what expectations of the future he considered most probable. When the industry is not unified horizontally, the development of combination depends upon how easily leadership in the industry can be assumed and how completely the industry can be co-ordinated. When the achieved unified structure depends upon a more or less voluntary co-operation among the various segments of the industry, the possibility of widening or contracting the area of control through the effect of changes in expectations on asset ownership becomes very real.

In the comparison of the two types of operation, consideration should also be given to the possibility that the monopolist might not be able to take advantage, because of certain restrictions, of the optimum course that might be available. This is more properly a problem in oligopoly rather than in monopoly and has to do with the fear of action in any respect that might cause suspicion on the part of the others in the industry. Wallace in his study of the aluminum industry clearly established this point in so far as a single monopolist might better realize optimum price and quantity than two duopolists who might be frozen into inactivity for fear that whatever movement started could not be controlled within the optimum range.[12] Where a sheltered part and a com-

financed, the small operators having the savings adequate for the purpose, on which they would otherwise receive only savings-bank rates, which are below the rates the big companies pay. Or it may be that the small companies survive by paying less than union wages, thus outbidding their larger competitors. Or it may be that the small new investors are simply deceived about the prospects of the industry."

[12] Donald Wallace, *Marketing Control in the Aluminum Industry* (Cambridge, Mass., 1936), pp. 336 ff.

petitive part of the industry exist together, as exemplified in the anthracite and lumber industries, the sheltered part may find itself unable to follow the optimum course in a situation where reprisals on the part of others in the industry might be feared. Instead of stepping up production, a safer policy of doing nothing can apparently be followed, at the same time selling off or abandoning resources whose competitive value has been brought closer to the monopolistic one. The derived course of action is that in which the controlling firms attempt to maintain their position in the industry and their price structure (through advertising and product differentiation) while simultaneously offering to competitive newcomers in the industry what appear to them, *ex ante* at least, capitalization bargains.

This analysis of exhaustible resources can be helpful in explaining the structural characteristics of industries in which large amounts of capital are important. When costs of initiating a business are heavy, and when favorable conditions of demand are expected, the tendency for combination and consolidation is unmistakable, whether or not this is the sole cause. For example, the steel industry, agricultural machinery, copper, lumber, and chemical industries exhibited these characteristics to a striking degree when the prospects of the future were bright. On the other hand, the declining periods of the steel, copper, lumber, and soft-coal industries have shown outbursts of competition. Indeed, in soft coal the ravages of competition have been so intense as to call for government regulation throughout the world. Cutthroat competition, a problem usually associated with large amounts of durable capital, in which the problems of price and output and capital recovery are intertwined as in the exhaustible resource case, is thus shown to be part of a general characteristic and not an isolated event. Declining industries, when the aspect of exhaustible resources is of importance, thus tend to break away from monopolistic controls and to become competitive. Advancing industries of this type, in addition to the usual incentives to monopolistic control of industry, have a more subtle incentive for industrial co-ordination.

ON STRIKE ANALYSIS

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THE following plan for a new type of strike analysis[1] gives expression to the conviction that specifically different kinds of labor disputes require specifically different provisions for adjustment and that, to judge the effectiveness of existing adjustment machinery and wisely to design new measures for strike prevention, a knowledge of the situations out of which the disputes arise is necessary. These situations, however, in the present stage of industrial development in the United States are largely characterized by their relation to labor legislation and public industrial policies.

To adapt strike analysis to this purpose two modifications of the present official procedure will be necesssary.[2] First, the classification of strike issues must be based on distinctions as to types of disputes and relative to labor laws and public policies. Second, the tabulations must be made as "multidimensional" as possible, so as to show simultaneously all the important characteristics of the disputes.

The ideal would be to show simultaneously the number and extent and duration of strikes over all the various issues in the various industries and states. But this would be almost impossible, since complete cross-classifications of this kind would cover acres of tables. Our plan, therefore, may be said to represent an attempt in the indicated direction through a compromise between the desired completeness of cross-classifications and the necessary limitations as to scope.

I. CLASSIFICATION OF STRIKE ISSUES

We begin with the question of the classification of strike issues, first pointing out in what respects those used by the Bureau of Labor Statistics fail to serve our purpose and next developing our own plan.

[1] The strike analysis here proposed is meant for the "normal" functioning of industry, not with regard to the special problems of the emergency situation.

[2] The classifications presently used by the Bureau of Labor Statistics in its monthly and yearly strike analysis give the number and extent of strikes by industries, by states, by industrial groups relative to states, by major issues, by duration, by methods of settlement, by results, and by results relative to issues.

1. *Reasons for not adopting the Bureau's classifications.*—The Bureau's classifications are as follows: (1) wages and hours (separately and jointly), subclassified as to increases and decreases respectively demanded and resisted; (2) union organization, subdivided into recognition (alone and in conjunction with wages and/or hours), discrimination, closed shop, and "others"; (3) miscellaneous, under which heading are listed jurisdictional, rival-union, and sympathy strikes and "others."

Wages and hours, from our point of view, are not necessarily a significant separate class. On the one hand, these issues belong closely together with various other terms of the labor contract, such as overtime, vacations, abolition of piecework, etc. Second, and more significant, since, with the enactment of the federal and the various state labor relations acts, the establishment of collective bargaining has become a major point of public policy, it is important to know to what extent the disputes over wages and hours occur in connection with collective agreements and, if they do, whether they arise in the course of negotiating new terms or whether in violation of an existing agreement. Again, wage-hour disputes falling under a minimum-wage or maximum-hour law have for that reason a very different character from those occurring in the absence of a law bearing on the issue.

There are similar distinctions as regards the issues of union organization. Since the enactment of the various labor relations laws, it has become important to know to what extent disputes over the right to organize and bargain collectively occur in industries within the jurisdiction of these acts where labor relations boards exist for the purpose of settling such disputes without strikes and to what extent they occur in industries not covered by these laws. The closed shop, on the other hand, plays a separate part among the organization issues, as not being anywhere in the category of a right enforcible under laws.

Again, as to intra-labor disputes, in the present situation the question is not merely whether the strikes are occasioned by disputes between unions of the same or of different parent-organizations (in which feature lies the distinction between jurisdictional and rival-union disputes). But, since under the labor relations acts the determination of bargaining units and of bargaining agents for the workers has become a matter of public concern, with governmental boards in charge of elections and certifications, it is important to know to what extent strikes occur over questions of representation and, in particular, to what extent they occur where the workers have labor relations boards

at their disposal through which they might get their claims peacefully established.

Altogether, there are basic distinctions running crosswise to the customary classification of strike issues. First, there is the fundamental distinction, in terms of which the adequacy of adjustment machinery is most poignantly revealed—that between disputes over conflicting interests, on the one hand, and quasi-legal disputes concerning rights under statute laws or under collective agreements, on the other. And, second, there is the distinction, less basic but of great interest in the present phase of industrial development in the United States—that between disputes occurring in the course of collective bargaining and disputes occurring in the absence of collective bargaining.

2. *Plan for a new classification of strike issues.*—We shall next attempt a classification of strike issues based on these distinctions.[3]

a) *Disputes on conflicting interests.*—In a first class we should place all strikes in disputes over conflicting interests between labor and employer. This class would thus contain strikes over any kind of new terms or conditions which are not yet laid down by existing law or agreement.

These strikes would be divided into two groups: (1) those occurring in the course of collective bargaining and (2) those occurring where no formal collective bargaining between employer and workers' representatives was taking place.

Within each of these groups the various issues would be separated as far as useful: wages, hours, methods of wage payment, vacations, seniority rights, etc. Strikes over certain organization issues also fall into these groups. There belong here, first, strikes over the closed shop and, second, strikes over the right to organize and bargain collectively, over antiunion discrimination, against company unions, etc., if occurring in industries not covered by federal or state labor relations acts, so that these issues relate to "interests" rather than to "rights." Strikes of this kind will occur, by their nature, exclusively or primarily in the second, noncollective-bargaining group.

b) *Quasi-legal disputes.*—In a second class we should place all strikes over disputes of a quasi-legal character, that is, strikes over the

[3] In making the following classifications we are well aware of the frequent lack of clear definition of issues in strikes. As regards the handling of overlapping strike issues, see below, p. 754. On this point see also Bureau of Labor Statistics, *Strikes in the United States, 1880–1936* (Bull. 651), Appen. II, pp. 166–67.

violation, or over the interpretation and application, of (1) statutes and (2) collective agreements.

In the first of these groups would fall chiefly the strikes over all the various "unfair labor practices" in industries under the jurisdiction of federal or state labor relations acts, also strikes over terms falling under minimum-wage or maximum-hour or any other labor law.

In the second group would be placed strikes over rights under an existing agreement, over alleged violations of its terms by the employer, over changes attempted contrary to its stipulations, over the application or interpretation of an agreement to a given situation, or over any of the manifold grievances with respect to shop management and shop discipline under an existing agreement.

c) *Intra-labor disputes.*—In a third class, finally, we should place strikes over intra-labor disputes. Among these we should form a separate group of the strikes over the question of representation for collective bargaining. Within this group the further distinction would be made between strikes in disputes within the jurisdiction of labor relations boards able to determine the bargaining agent without strikes and those outside their jurisdiction. Other intra-labor strikes not involving the issue of representation would be placed in a group by themselves.[4]

Within each group the disputes could be separated as far as desirable according to the labor organizations involved: A.F. of L. or C.I.O. alone (jurisdictional), and A.F. of L. versus C.I.O., or either one against independent organizations (rival union).

II. CROSS-CLASSIFICATION OF ISSUES WITH OTHER SIGNIFICANT STRIKE DATA

We next consider the question as to what data regarding these several classes of strikes could be tabulated with a view to obtaining as clear a picture as possible of the disputes which occasion the strikes.

1. *Number and extent of strikes.*—There is, first of all, the number of strikes, of workers involved, and of man-days idle.[5]

[4] Sympathy strikes, however, would not be placed in this class, since they are instances not of intra-labor disputes but, on the contrary, of intra-labor solidarity. From our point of view, they would be best classified according to the issue involved in the primary dispute.

[5] As regards the inherent difficulties of precise definition and application of all these several units of strike measurement see Bureau of Labor Statistics, *op. cit.*, pp. 7–10.

Right here a considerable difficulty arises from the fact that in perhaps the great majority of strikes several issues are simultaneously involved (e.g., wage increases, vacations with pay, the closed shop, or abolition of piecework and recognition of a particular bargaining agent). This difficulty exists, of course, for every analysis of strikes by issues; but it becomes the greater, the more detailed and the more logical the analysis proposes to be.

If to overcome this difficulty one classifies strikes only by the major issues involved, much valuable information on current industrial issues is lost. If, on the other hand, one were to classify each strike under all the issues involved, a most misleading overlapping would result. The method currently used—of listing frequently occurring combinations of issues (such as recognition and wages; recognition, wages, and hours)—is not satisfactory either. On the one hand, if one were to list all such combinations, the enumeration would become cumbersome. Moreover—what is worse from our point of view—where issues belonging in different classes of disputes occur together, our whole classification would be disrupted.

To avoid all these disadvantages we propose that there be reported under each issue, if necessary, two figures. The first one would refer to the instances where the issue was the sole or major issue, the second one to instances in which it was a secondary or minor issue only. The totals given for each class would thus, it is true, not necessarily equal the sum of the several subclasses. But this imperfection—if it is one—would seem to be amply overbalanced by the greater completeness of the information obtained.

2. *Distribution as to industries.*—Both for diagnostic and for remedial purposes it would be of greatest value to show in what industries the strikes over the various issues occur, e.g., where the closed shop or union recognition or representation is occasioning strikes.

As pointed out above, a complete cross-classification of industries and issues would be out of the question, especially if the issues are analyzed in as much detail as here proposed. What would, however, be quite feasible is a tabulation showing "chiefly in what industries" the various issues have occasioned strikes. Some satisfactory objective interpretation of the term "chiefly" could doubtless be found—such, for instance, as to list the few highest industries (or rather industrial groups) with the percentage figures for their share in man-days idle placed after them (e.g., shipping [50], textile [32], steel [10]). In some

such manner this valuable, even though incomplete, information could be given in a single column.

3. *Distribution as to states.*—In a similar way one could list in a further column "chiefly in what states" the various kinds of strikes have occurred.[6]

4. *Strike duration.*—Information concerning the duration of strikes over the various issues in the various industries and states would be valuable to show what strikes and in what industries—if any in particular—seem on the whole the more or less stubborn and perhaps also whether certain kinds of improved adjustment machinery appear to show their effect in gradually reducing the duration of strikes (although one has, of course, to grant a priori that in a given situation a multitude of more or less accidental factors may combine to determine the duration of a strike). For obvious reasons this information should be given—as it is at present—not in the monthly reports but only in the yearly summaries.

One feasible way of reporting the duration of strikes within the limits imposed by the multiple cross-classification would be to give in two columns (*a*) the average duration of the strikes over the various "sole or major issues" during the year and (*b*), for additional distinctness, the duration also of the longest strike in the particular class.

5. *Agencies of strike settlement.*—Finally, in the yearly summary further valuable information could be inserted concerning the various agencies with whose help the settlement was brought about, showing, e.g., how many strikes (perhaps also with how many workers involved) over the various "sole or major issues" were settled by the United States Conciliation Service, the National Labor Relations Board, the War Labor Board, state labor relations boards, state mediation and arbitration boards, or the private adjustment machinery set up by the parties themselves. With cross-classification by issues and, partially, by industries and states, an informative picture of the activity of these several agencies might be expected to result. Table 1 illustrates the kind of multidimensional strike analysis which we are proposing.

[6] As regards the analysis both by industries and states and by industrial groups relative to states, the very extensive tabulations of the Bureau of Labor Statistics would, of course, answer all questions concerning strike totals in which the analysis by issues is of little or no interest.

TABLE 1*

Plan of Tabulation for Proposed Strike Analysis

Issues Analyzed by Types of Disputes	Extent of Strikes†			"Chiefly" in What Industries‡	"Chiefly" in What States‡	Duration in Days§		Number of Strikes Settled by Various Agencies§									
								Federal					State		Local	Private	
	Number of Strikes	Workers Involved (in Thousands)	Man-Days Idle (in Thousands)			Average Duration	Duration of Longest Strike	National Labor Relations Board	Maritime Labor Board	U.S. Conciliation Service	War Labor Board	Etc.	State Labor Relations Boards	Mediation and Arbitration Boards	Public Local Adjustment Boards	Workers and Employers Directly	Private Adjustment Machinery
I. *Disputes over conflicting interests*																	
Making or changing collective agreements:																	
Wages	28 10	642 139	3,647 2,146	Coal (60); Textile (32)	Ill. (40); Ky. (30); N.J. (10)	16	38 (Coal)	.....	2	3	2	.....	.....	2	.....	10	6
Hours																	
Overtime																	
Vacation																	
Seniority	... 5	... 61	 329	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Closed shop	35 10	856 523	52,132 6,188	Steel (40); Coal (30); Auto (20)	Ind. (35); Ky. (30); Mich. (20)	30	65 (Coal)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Etc.																	
Employment terms without collective bargaining:																	
Wages																	
Hours																	
Overtime																	
Vacation																	
Seniority																	
Closed shop																	
Union recognition‖																	
Grievances																	
Etc.																	

* The data are of necessity fictitious.

† As regards the horizontal double rows of figures for each issue under "Extent of Strikes," the upper row refers to strikes in which the issue in question was the sole or major issue, the lower one to strikes in which the issue was a secondary or minor one. The single row of data in all the other columns refers to the strikes in which the issue was the sole or major one.

‡ The figures in parentheses give the percentage of the total of man-days lost over the issue in the respective industries and states.

§ The columns showing "Duration" and "Agencies of Settlement" are meant only for yearly summaries and not also for monthly reports, as are the other columns.

‖ In industries where the right to organize and bargain collectively is not guaranteed under federal or state law.

TABLE 1—*Continued*

† For definitions including "Number of Strikes" and "Agencies of Settlement" see memo only for yearly summaries and not also for monthly reports, as are the other columns.
‡ In industries where the right to organize and bargain collectively is not guaranteed under federal or state law.

TABLE 1—*Continued*

Issues Analyzed by Types of Disputes	Extent of Strikes†			"Chiefly" in What Industries‡	"Chiefly" in What States‡	Duration in Days§		Number of Strikes Settled by Various Agencies§									
								Federal					State		Local	Private	
	Number of Strikes	Workers Involved (in Thousands)	Man-Days Idle (in Thousands)			Average Duration	Duration of Longest Strike	National Labor Relations Board	Maritime Labor Board	U.S. Conciliation Service	War Labor Board	Etc.	State Labor Relations Boards	Mediation and Arbitration Boards	Public Local Adjustment Boards	Workers and Employers Directly	Private Adjustment Machinery
II. *Disputes over quasi-legal issues*																	
Violation and application of labor laws:																	
National Labor Relations Act	20 4	108 5	695 1.3	Oil (68); Auto (25)	N.Y. (52); Mich. (30)	15	28	11	.....	3	1	.....	.....	1	1	.....	.....
State labor relations acts	15 ...	493 ...	2,166	Building Service (100)	Wis. (100)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wage-hour laws																	
Etc.																	
Disputes under existing collective agreements:																	
Violations of agreement																	
Interpretation of agreement																	
Grievances																	
Etc.																	
III. *Intra-labor disputes*																	
Representation for collective bargaining:																	
1. Under labor relations board jurisdiction:																	
A.F. of L. only	3 ...	86	250	Steel (100)	Ind. (100)	19	44	.....	.....	.....	.....	.....	.....	.....	.....	1	2
C.I.O. only																	
A.F. of L. versus C.I.O.	8 ...	120	340	Auto (70); Rubber (20)	Mich. (60); Ohio (30)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
A.F. of L. and/or C.I.O. versus independent organizations																	
2. Not under labor relations board jurisdiction:																	
A.F. of L. only																	
C.I.O. etc. (as above)																	
3. Other intra-labor disputes:																	
A.F. of L. only																	
Etc. (as above)																	

III. CONSTRUCTIVE RESULTS TO BE OBTAINED FROM STRIKE ANALYSIS

Finally, we shall point out in what particular respects our analysis might be helpful to diagnose the nature and seat of the industrial maladjustments which occasion strikes and thus to judge the adequacy of existing and of proposed further adjustment machinery.

1. *Measures to assist in the making of collective agreements.*—The analysis would reveal, first of all, to what extent strikes are occasioned by disagreements on the terms of the labor contract under regular, organized collective bargaining.

The extent to which these disagreements concern wages, hours, and other working conditions might suggest, first, the desirability of requiring more generally that employers and workers give each other sufficient advance notice of intended changes in rates of pay or other employment terms so as to allow each other enough time for consideration of the proposition and for negotiation; and, second, the need for further mediation machinery, permanently set up, perhaps industrially specialized, authorized to intervene ex officio and to ascertain all facts pertaining to the dispute, well qualified to mediate between the parties, perhaps authorized to require refraining from strikes for certain periods pending mediation, and with authority to make its findings public where the pressure of public opinion may be expected to exert a wholesome influence on the parties—in short, the kind of mediation service which the National Mediation Board is rendering with such outstanding success to collective bargaining in the railroad industries.

A great and growing number of strikes over the terms of collective agreements, on the other hand, will be found to concern not wages, hours, and related employment terms but the closed shop. For strikes of this kind, mediation machinery is likely not to be nearly so helpful as for the other issues, for here a contested principle is involved, and one on which opinions are at this time widely divided. Considering the present trends of industrial development, however, it is possible that a general legislative solution of this problem might eventually be found feasible, especially after a reunification of the labor movement.

Our analysis would also show separately to what extent and chiefly where strikes over all the various employment terms occur in the absence of collective bargaining.

These figures in comparison with those relating to collective-bargaining strikes would be of interest in themselves, especially if available over a number of years. They might also be helpful in directing legisla-

tive and administrative efforts toward further advancing the cause of collective bargaining. Finally, the situation reflected in these figures might be found to call for separate mediation machinery specially designed for the needs of unorganized labor disputes.

2. *Measures to insure collective bargaining.*—The information to be gathered from our analysis concerning strikes over the right to organize and bargain collectively would throw much-needed light on the question of the effect of the Wagner Act on strikes. For it would show separately where and to what extent strikes are caused by these issues in industries outside governmental protection of this right, where strikes are still the workers' chief weapon, and in industries under the jurisdiction of labor relations acts, where governmental boards exist to settle such disputes.

In the former case these figures might—or might not—reveal the desirability of further state labor relations acts to guarantee these rights to the workers in the respective intra-state industries. In the latter case the figures (especially if studied together with the reports of the various labor relations boards concerning complaint cases submitted for adjustment) would show, better than all partisan argument, the specific effect of the Wagner acts (federal and state) in reducing strikes over the right to organize and bargain collectively in industries under their jurisdiction.[7]

The information concerning "representation strikes," to be derived from our analysis of intra-labor disputes (also to be used in conjunction with the reports of the labor relations boards on "representation cases"), would, moreover, show to what extent these governmental boards are succeeding in solving labor's problem of peacefully choosing its own bargaining agent, or whether perhaps some more basic rulings might appear necessary, e.g., with respect to the determination of bargaining units, the holding of elections, etc.

3. *Measures to adjudicate disputes under existing agreements.*—Our analysis would, finally, show to what extent and chiefly where strikes are being caused, not by failure to bargain collectively or by failure to come to an understanding on the terms of the agreements, but by failure of the parties to get along with each other under an existing agreement, either because they do not abide by its terms or because of differences as to the interpretation or application of the agreement to particular situations.

[7] On this point see my article, "Strikes under the Wagner Act," *Journal of Political Economy*, XLIX (1941), 722–31.

This information might thus reveal chiefly in what industries and states there appears to be need for more quasi-judicial adjustment machinery to adjudicate disputes of this kind. Such machinery might be a permanent impartial chairman, as provided in many industries under the agreement, or a permanent arbitration board, private or public, set up either locally (of the nature of a "labor court") or for particular industries (of which type the National Railroad Adjustment Board is perhaps the most prominent example in the United States).

We believe that the somewhat bulky scope of the strike analysis here advocated would justify itself through the specific character of the information which it would impart and its value for the diagnosis and successful treatment of the several ailments with which present-day industrial labor relations are afflicted.

BOOK REVIEWS

The Theory of Consumers' Demand. By RUBY TURNER NORRIS. New Haven: Yale University Press, 1941. Pp. xiv+206. $3.00.

This is a book which, because of its intelligent originality, may well become a steppingstone to further developments in demand theory; and it is a book which, because of some of its faults, may be very much underestimated by those who start with the first two chapters and then impatiently jump to the end.

Mrs. Norris' fundamental purpose was to undertake the development of a theory of consumers' demand which would come closer to the real processes of choice-making. She approached this problem primarily through the theory of monopolistic competition, emphasizing the significance of the fact that choices are commonly made from among items in clusters of close substitutes and expressing the opinion that duplications of purchase by the same individual are more the exception than the rule. At the same time she takes another slant, attempting to distinguish between long- and short-run problems of choice-making. These two approaches are woven together (rather crudely) at many points. Most of the ideas are crowded into chapters vi, vii, and viii.

The first three chapters of *The Theory of Consumers' Demand* are devoted to an evaluation of the present status of demand theory, as seen in Marshallian utility analysis and Hicksian indifference analysis. This is the weakest part of the book, especially in chapter ii, where translations between utility and indifference analysis are attempted. A mathematical demand theorist picking up this book would doubtless find his way very quickly to some elegant and very fancy-looking indifference maps in that chapter. Here Mrs. Norris ran into a snag, which resulted in the drawing of curves indicating, for example, that three pounds of butter plus three pounds of oleomargarine would lie on a much lower indifference curve than would one pound of either alone! (p. 31). In fact, if these indifference curves had been drawn correctly under her assumptions concerning utility, they would have been straight lines showing perfect substitutability between butter

and oleomargarine. I have found no other error in the entire book as glaring as this. It would be unfortunate if this chapter should lead readers to turn away.

Mrs. Norris' analysis of individual demands in a very short short-run situation (chap. vi) is suggestive. This short run is roughly the period between paydays. Goods are classified in four groups: (1) habitually consumed goods; (2) commitments from past consumption periods; (3) petty goods (which are below the margin at which consumers weigh their choices carefully); and (4) experimental purchases. Mrs. Norris examines these points briefly, especially noting the characteristics of petty goods and the question of stocking up and buyer forecast in purchasing habitually consumed goods. It is most disappointing that she then drops this analysis without adding anything to the material taken from her article in the *Quarterly Journal of Economics* in 1939. Her discussion suffers from a failure to discriminate clearly between time periods as periods for the working-out of given forces and time periods as periods of historical change—this despite a definition of the short run as one of "constant" income and tastes. She recognizes but fails to develop the setting of short-run decisions within the long-run framework. Her analysis of anticipations is extremely embryonic. Many of these limitations seem to be associated with Mrs. Norris' preoccupation with the theory of monopolistic competition and her failure to look very far in any other direction.

Chapter vii, entitled "Long-Run Demand: Choice of an Item from a Cluster of Substitutes," presents a very neat and interesting analysis of choice-making between items in a "cluster of substitutes." Mrs. Norris starts with an application of indifference analysis. She then follows through the same process with utility analysis and makes effective use of curves representing the utility of money at various income levels to show which of the items in a cluster of substitutes differently priced and of different degrees of utility would be chosen in each case. Finally the author shifts to the use of a "preference index," which is simply an index of individual "demand prices." She then shows that through this more objective device it is possible to accomplish essentially all that was done with utility analysis (and more than was done with the indifference-curve technique) and yet to avoid the assumption that utility is measurable. She fails to recognize the relation between her analysis (of "money differentials" between the demand prices of goods and their market prices) and Hicksian "compensating

variations" and Marshallian "consumers' surplus." But her attack is original and opens up some new possibilities for further work both in deductive logic and in empirical study. It is also a minor criticism that the "long-runness" of this analysis is doubtful; it could apply to either short- or long-run decisions.

Chapter viii is again very stimulating. This chapter is entitled "Long-Run Demands Continued: The Selection of Complementary Substitutes." Several major conclusions may be mentioned: (1) The divisibility of wants into the different services which a good or "cluster of substitute goods" may render is an important step in the analysis of demand theory which has not been sufficiently examined. (2) Such examination leads to a conclusion that rarely do people make duplicate purchases excepting in the breakfast-table illustrations of economic theory. (3) The larger the person's income the more specialized are his purchases likely to become. When to these conclusions is added her statement that "only now and then, and in strictly successive form, does he [a consumer] consider whether a good is really worth to him the things he is forced to forego to buy it," it follows that the simple theory of individual demand for various quantities of a homogeneous good has very limited applicability. It follows, moreover, that (as many empirical workers with statistical material on demand will agree) "it is in terms of related goods that demand as well as supply theory must be written." The principal flaws in chapter viii are that Mrs. Norris again stops short: (1) She postpones the treatment of repeat purchases overtime until chapter ix and thus appears to overstate her position in chapter viii. (2) She defines "complementary" and "substitutive" behavioristically, and then proceeds to use these concepts subjectively, in analyzing "complementary" and "substitutive" determinants of individual action. Here she could easily have carried her analytical framework a step further into consideration of introspectively judged preferences between goods for a particular single use versus a cluster of uses. (3) In summarizing (p. 144), she tacitly assumes continuous variations of quality and price to be possible, despite the fact that discontinuities characterized her illustrations. This analysis could easily have been adjusted to include allowance for discontinuity or at a minimum to recognize the shift in assumptions.

In chapter ix Mrs. Norris undertakes a re-examination of elasticity of commodity demand and monopolistic competition. Though the integration with previous chapters is not so complete as one might wish,

it is a step in the right direction. Her clearheaded realism serves her in good stead for the very keen and simple treatment given the Chamberlin-Kaldor-Robinson dispute over demand elasticities and numbers of sellers, though in the end it seems to me that she fails to give appropriate recognition to the value of the limiting concept of approaches to perfect elasticity as rival sellers of close substitutes are multiplied, hence to the value of the model of pure competition.

How do these comments add up?

Mrs. Norris' contribution is greatest where she ties up her analysis most closely with Chamberlin's work on monopolistic competition. This is true both of detail and of broad issues. By the same token she suffers from "Chamberlinitis," and other things are underrated. Monopolistic competition is sometimes unjustifiably identified with closeness of substitutes; and there is a failure to distinguish in some cases between the differentiation aspect of monopolistic competition and the oligopoly element in seller behavior.

She is too scornful, it seems to me, of the possibilities of resimplification of consumption theory through the development of concepts of a continuum from one limiting type situation to another and the consideration of minimum distinguishable differences. Despite this fact, some of her best ideas lead directly into such a treatment. Her suggestions concerning periods of demand fall by the way uncultivated; her whole concept of time in consumption theory is narrow; and when she attempts to broaden it her thinking is fuzzy. Finally, probability analysis of anticipations is ignored, despite some attention to "stocking up and forecast." Mrs. Norris apparently fails to see the extent of the possibilities for consumption theory in this expanding phase of economic thought, since she gives it no mention.

It would be most ungracious to end this somewhat critical review without a further word of praise. *The Theory of Consumers' Demand* is a difficult book to review, because at so many points along the way one is tempted to write an entire article. It has the great virtue of avoiding the application of abstract theoretical hypotheses to concrete situations. It is stimulating and constructive. Perhaps after all many of the criticisms presented above are really compliments. It is because after a thoughtful reading of this book one asks why the author didn't go further with many of her ideas that this is a book that stays open instead of one that is quickly closed.

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Profits: Theoretical and Practical Aspects. By JAMES P. BEDDY. Dublin: Hodges, Figgis & Co., 1940. Pp. xi+420. 12/6.

Mr. Beddy's treatise on *Profits* is organized along the familiar two-part plan, the two parts containing, respectively, a survey of the previous history of the subject and the author's own contribution. In the present case the historical matter (and a brief introduction) occupy slightly over a third of the whole (149 pp., 8 chaps.). It seems to the reviewer reasonably thorough—without pretense of exhaustiveness—and competent. There is no satisfactory solution, in writing history of doctrine or theory, for the problem of balancing between colorless summary and criticism, which latter again naturally overlaps with the statement of an author's own position. At a minimum, such a historical summary must indicate what seems to be erroneous or lacking in previous work in the field, which is the justification for the author's own work and so indicates something as to the character of the latter.

Mr. Beddy devotes about half of his historical section to consideration (in 2 chaps.—vii and viii) of "The Risk Theory of Profits." (A few paragraphs at the end deal with profits as a monopoly gain or quasi-rents, "eliminating" these views.) After recounting how "The Risk Theory, as expounded by Hawley and others, was set aside in favour of a Theory of Uncertainty-Bearing," the author reaches the conclusion that "uncertainty-bearing is *not* the cause of profits, nor does any portion of profits reward uncertainty-bearing, which itself is simply one of a number of resistances upon which costs of production rest, and is, therefore, rewarded in the same way as other costs of production." However, "Criticism of the Theory of Uncertainty-Bearing as an explanation of profits does not rest here. One of its principal defects is its lack of scientific precision. . . . . We have shown that . . . . for the great majority of risks [uncertainty] is indefinable" (p. 130).

As this reviewer understands the theory that uncertainty is a cause of profits, it has no implication that profit is a "reward" or compensation in any sense for uncertainty-bearing, and it is of the essence of the theory itself that uncertainty is "indefinable," meaning "not measurable." Probability is measurable, where we are dealing with large groups of cases which can be treated as homogeneous and where known conditions give us the probability distribution, as in a perfectly fair game of chance. This situation is more or less approximated in business life, where the statistics of past experience and general knowledge make a "risk" "insurable." But in major decisions, particularly those relating to innovations, the "uncertainty" (advisably distinguished from

measurable risk, as indicated) can only be estimated. It would seem clear that profit should be thought of as a reward for uncertainty-bearing only where or if it is possible to designate a class of operations for which it can be shown that the average return is greater than the "going rate" of remuneration for the resources employed, and then only to the extent of this excess. But it is more than doubtful whether such classes of cases exist; and general knowledge of the psychology of gambling, and of adventure in general, clearly indicates the contrary rule—that the more "risky" any activity is, the lower is likely to be the ratio between return and outlay, down to the magnitude of fairly small fractions, or zero, for such "economic" activities as inventing perpetual-motion machines. A gambler's winnings offset, or more than offset, by losses to others surely are not payment "for" anything.

If Mr. Beddy has any intelligible theory or explanation of profits, this reviewer has not been able to find it in his book. We cannot even discover any definition of profit, the phenomenon to be explained, though both "net" and "pure" profit are frequently mentioned. In chapter x of Part II, "An Explanation of Profits," we are told that profits arise from "acquired advantages" in contrast with those which are "natural" (p. 261). This chapter is preceded by one (60 pp.) giving a general discussion in accounting and statistical terms of the "Actual Profits of Business Concerns" and is followed by one (of the same length) on "Advantage." These are classified under some ten heads, from "Legal and Political," to "Predatory Methods," with a short concluding section on "Luck." This chapter is followed by one on "The Wider Significance of Profits," and this by one entitled "General Considerations." The last section of this chapter develops a "non-functional view of distribution," which seems to be, in the author's own view, his major contribution. This theory is to supplement, not replace, the orthodox theory, described as functional, and is held to be applicable to "dynamic" conditions, as the orthodox functional theory is not.

The author's scheme yields four types of income. The first covers maintenance and, "if society so desires," provides for renewal of a worker, a skill, or a capital instrument. The second consists of "such sums as may be required to reward the undertaking of disutilities." The third covers "rent arising from the possession of natural advantages," and the fourth is the "profits arising from acquired advantages" (p. 366). The reviewer finds it hard to criticize this theory seriously. Provision for maintenance, including renewal, certainly is not income

at all. Only confusion can result from treating even wages as the reward for undertaking disutility, and this view of the return on capital is quite untenable because of the role of time in connection with saving and the use of saving as a source of a return, which is "perpetual" unless the whole economy in which it occurs is liquidated. Most of what are called "natural advantages" have in fact been "acquired" at a cost, which, on the average, at any time in history, has been more than their value. And, finally, even more obviously, acquired advantages have been acquired at a cost, and the return is the productivity of investment, except for divergencies, owing to uncertainty, on which a sound theory of profit must chiefly center. This applies specifically to "monopoly" advantages, regardless of social justification.

The first principle of a sound theory of profit certainly is that it is connected with imperfect competition, as Mr. Beddy recognizes, in noting its absence from the "Static State" (p. 235). Second, uncertainty, or, specifically, imperfect foresight, is unquestionably the general cause which makes competition imperfect in so far as it is not interfered with by "force," including gross fraud, which is also clearly a phenomenon of uncertainty. Finally, any positive profit is also a phenomenon of monopoly, or of "quasi-rent," if one looks at the forces which enable monopoly to continue to exist, in contrast with the circumstances in which it originates.

The main significance of Mr. Beddy's book would seem to lie in his descriptive and discursive material, especially the emphasis on the complexity of economic processes and forces. It surely cannot be credited with any important contribution to theoretical analysis or the definition of economic categories. It would have been much improved for the use of readers—and the task of a reviewer would have been made much lighter—by the addition of an adequate subject index along with or including the index of "Authorities Quoted."

FRANK H. KNIGHT

University of Chicago

Economic Principles in Practice. By BRUCE WINTON KNIGHT. Rev. ed. New York: Farrar & Rinehart, Inc., 1942. Pp. xiv+659. $3.50.

The facile and colorful composition which was so distinctive in the first edition has been preserved in this revised edition, and the organization and analytical content have been improved greatly. No longer may it be said that "too great concessions have been made to the stu-

dent who listens to the radio as he reads" (*American Economic Review*, XXIX, 554). This is the most interesting book on "Principles" which this reviewer knows of, and principles are stated with greater precision and are somewhat more advanced than is usual in elementary textbooks. Many pearls will fail to capture primeval student interest and will be trampled underfoot. The book should be read carefully by every teacher who has responsibility for undergraduate courses in "Principles," and it deserves the benefit of wide judgment and criticism for its perpetuation. The classic elegance of doctrine and exposition which characterizes portions of the book could be sustained throughout with patience by the author.

The book is enlarged by only fifty pages, but it is reorganized into nine more chapters on "Diminishing Returns and Costs," "Demand and Supply," "Prices under Competition," "Finance, Risk, and War Power"; and separate chapters on "Rents," "Interest," "Wages," and "Profits" replace "Distribution," which formerly was tucked away under "Economic Inequality." Greatest changes are more adequate treatment of distribution and large new portions on cost and revenue analysis with abundant graphic illustrations. Some of this analysis may be too involved for successful elementary usage, but this reviewer used the book as a text successfully this summer. A discourse on trade association "methods of taming price competition" is perhaps not adequate treatment of monopolistic competition, particularly since the author thinks that "most of the real competition of today, as well as most of the real monopoly, is monopolistic competition of one degree or another" (p. 252).

There are some minor errors in the book. This reviewer does not understand that the demand schedule

Prices	Buyer A
$1.02	900
1.01	930
1.00	955

means that "this buyer would take 900 bushels at $1.02, *and he would take 30 bushels more* [reviewer's italics] (*not* 930 bushels more) at $1.01, and so on. Here the *increment* of demand at $1.01 is 30 bushels" (p. 148). A would pay $939.30 for 930 bushels, but the author has him also paying $948.30 (900 at $1.02 plus 30 at $1.01). *Which* amount does he think A would pay for 930 bushels? Does the schedule give any sequel to A's conduct *after* he has exercised one of the "alternative

possibilities"? Why not also say that A would *sell* $9.30 worth of wheat if, after buying 930 bushels at $1.01, the price rose to $1.02? The same view is implicit and is logically required, although not stated, in the interpretation of the inverted supply schedule on pages 165–66. Such an "increment" interpretation of a supply schedule under decreasing costs would lead to unique results.

Because of large fixed costs, it is not economical and probably not possible that "the charges for railway services as a whole and the charges for individual services should be based on average cost of production" (p. 266; cf. p. 228). It is not apparent why expanding monopoly output becomes less economical and the average costs higher than would be the case under competition because monopoly "output cannot be expanded without increasing the size of the single firm which occupies the field" (pp. 219–20). Presumably a monopoly would have plants of optimum size, and it is doubtful that monopoly "control" would lead ordinarily to increasing costs. The relationships stated (p. 81) between the monetary standard, standard money, actual money, and prices are hardly "the general principle." "Owing to the long run tendency for additional companies to enter the industry if the price exceeds average cost, the long run cost schedules are schedules of average cost" (pp. 197–98). If costs vary among producers and production is under diminishing returns, can marginal costs be excluded? It is doubtful if this statement is understood as the author meant it. The graphs of monopoly costs (assumed to be the same for competition) seem to show competitive production carried to a point where average cost equals selling price but where marginal cost is higher than selling price (p. 219). The graph of "Decreasing Cost" (p. 174) seems calculated to invite misunderstanding. Possibly it should be successive *U*-curves.

Professor Knight expresses freely rare and impartial realism about the imperfections of things that are and things to be, and he goes consciously and rather far in appraisals of "the rules of the game" and moral claims to wealth and income:

> The marginal productivity of agents is ascertained largely by guesswork, by trial and error [p. 211].
>
> The very rules of private property . . . . deny equality of opportunity. . . . . To many men they deny fair opportunity to acquire ability to increase their income. . . . . Labor rules exclude millions from their ranks, permit unearned labor incomes, and obliterate essential distinctions between property and labor incomes [p. 468].

> Talking one way and acting another is so deep-rooted in American trust policy, if not in "liberalism" itself, that actually going through with the "New Deal" would have meant a terrifying breach of tradition [p. 326].
>
> There is justice to the complaint that farmers are being pampered. . . . . However, the basic trouble is that pampering itself has been made a way of life on altogether too large a scale in our whole economy. . . . . Organized agriculture is merely undertaking to do what organized industry and organized labor did before it: to increase its share of the national income by methods which decrease the national income. This is not really economics. It is politics. What is needed is the abolition of the politics of pampering [p. 312].
>
> For the future, we seem to have a choice between the combined evils of monopoly and chaotic competition, on one side, and the evils of farflung regulation on the other. . . . . Politicians, in or out of a job, will try to make hay by exaggerating this way or that. "Pressure groups" will increase the difficulty of making any clear-cut choice at all [p. 330].

Here are appraisal and criticism not written by a special pleader or the apostle of any cult. None of it is tiring, none is misplaced. It should unsettle sophomoric certainty.

LEWIS SEVERSON

Beloit College

Studies in American Demography. By WALTER F. WILLCOX. Ithaca: Cornell University Press, 1940. Pp. xxx+556. $4.50.

Students of demography in general and of American demography in particular will be grateful for this collection of the papers, lectures, and notes on American demography by the dean of American demographers and statisticians. When Professor Willcox was an undergraduate, Robert Giffen was referring to the unparalleled increase of the American population as "the greatest political and economic fact of the age"; and vital statistical registration in the United States was in its infancy. Today the American population is no longer replacing itself, and registration is approaching completeness and adequacy. In the intervening half-century Professor Willcox not only taught at Cornell (until 1930) for forty years and published a great number of studies but he also acted as chief statistician of the census of 1900 and helped to bring about many of the improvements in the gathering and analysis of census data, participated in a great number of the meetings of the American Statistical Association and the International Statistical Association, and served as president of both the former organization and the

American Economic Association. Probably no living American scholar has done more than Professor Willcox to promote and stimulate what Petty aptly called "political arithmetic." The shades of Von Mayr, Bodio, Levasseur, Farr, and Shattuck, to whose memory this work is dedicated, are fittingly honored.

The papers composing this study have been classified under three heads. Under "Studies in American Census Statistics" the author discusses the statistics of sex, age, race, literacy, foreign-born, marital condition, and rural-urban density; world and American population increase; the prolongation of life; statistical tests of progress (Professor T. N. Carver characterized a paper given by Professor Willcox on this topic in 1913 as "one of the most definite, clearcut, and constructive contributions ever made in the field of sociology"). Under "Studies in American Registration Statistics" are included papers on the development and uses of American registration statistics; crude and standardized death rates; the effect of the marital state upon the death rate; seasonal distribution of births and deaths; the birth rate and substitutes for it; the alleged increase of cancer; divorce rates; and immigration. Under "Miscellaneous Studies" are included biographical sketches of Billings, Graunt, and Shattuck and papers on statistical societies, court use of social statistics, and the measurement of public opinion about the Eighteenth Amendment. Papers on definitions of statistics and of demography and on the population of China and its modern increase, together with a bibliography of the author's more important writings, appear as appendixes. Two hundred and twenty-five tables, forty charts, and an index are included. Almost all the papers have been brought up to date. It is no exaggeration, therefore, to say that whoever would be familiar with American demography must read this book and familiarize himself with the wealth of information contained therein.

The findings of the author are too varied and numerous to permit even an attempt at summarization. The discussions of natality, natality trends, and natality differentials are especially interesting. The estimates of world-population growth have not yet been significantly improved upon. Later data corroborate his prediction of a half-century ago relative to the frequency of divorce. The data on changes in population composition illuminate the past half-century. In general, the papers are marked by a clarity and a practical common sense often lacking in recent statistical accounts.

J. J. SPENGLER

Duke University

Social and Economic Aspects of Swedish Population Movements, 1750–1933. By DOROTHY SWAINE THOMAS. New York: Macmillan Co., 1941. Pp. xxiii+487. $6.00.

Sweden remains a source of especial interest to students of population movements because: (*a*) both pre-twentieth century and current demographic data are more extensive than the materials available for non-Scandinavian countries; (*b*) analysis and interpretation of Swedish data may yield generalizations in the light of which population policies consistent with democratic principles may be formulated and implemented. Dr. Thomas' study is one of three (the two dealing with demographic differentials and demographic selection have not yet appeared) concerned with Swedish population movements and with the effects of changing socioeconomic conditions upon these movements. In Part I of this study the author traces the movements of marriage, birth, fertility, and death rates and of change in the age, marital, and civil composition of the population; and describes modifications in the agricultural and industrial character of the Swedish economy, together with associated changes in rural-urban migration, urbanization, class-structure, etc. In Part II communities are analyzed by type (for the period 1895–1933) with respect to the behavior of various demographic variables and the influence of business fluctuations upon some of these variables. Many tables and charts and several appendixes (one dealing with the mathematical determination of demographic trends) are included.

Under the impact of a persisting excess of births over deaths, rural population pressure continued to increase until about 1870; and, despite repartitioning, inclosure, supersession of the commonfield system, and extension of the area under cultivation, the landless rural proletariat swelled in number, comprising "about a third of the productive groups" in 1870, when industrialization in Sweden, together with emigration to America, began to stem and subsequently to reduce rural population pressure. The absolute and relative number of persons of rural proletarian status declined most in response to these new conditions. Latent agricultural population pressure persisted, however, although in diminishing measure. Whereas the "push" of harvest failures affected rural emigration prior to 1870, the "pull" of America and of Swedish industry became dominant in subsequent years. Between 1870 and 1908 rural emigration fluctuated with business conditions in America, with the proviso that "in prosperous years, Swedish industry

was able to compete successfully with the lure to America." Since around 1908, when emigration to America began to decline rapidly, Swedish industry has absorbed rural emigrants, internal migration has dominated the pattern of Swedish population movements, and net reproduction has fallen below the replacement level.

The findings presented in Part II are quite detailed and therefore even less amenable to summarization than the varied materials presented in Part I. Urban mortality, once higher than rural mortality, is now lower. While fertility and natality vary with type of community, intercommunity differences are not so marked as formerly. Migration from rural communities fluctuates, as in the United States, with the degree of prosperity of industry; it varies also with community type. Both demographers and students of social and economic history will find this fact-laden study extremely useful.

J. J. SPENGLER

Duke University

Three Aspects of Labor Dynamics: A Report Prepared for the Committee on Social Security. By W. S. WOYTINSKY. Washington: Committee on Social Security, Social Science Research Council, 1942. Pp. xiv+249. $2.50.

The term "labor dynamics" as used in this title means all kinds of variations in the size and composition of a nation's labor force. This study seeks to analyze three types of such variations, including: (1) labor turnover of employed workers; (2) distinctive characteristics of labor turnover among the unemployed; and (3) the movement of "forced entrants" or "additional workers" into and out of the labor market during depressions. The volume thus consists of three major divisions, with seventeen chapters and an appendix. For each major section, two preliminary chapters outline objectives, methods, and findings. Succeeding chapters in each section apply the methods to such historic data as are available and describe the findings in greater detail.

Part I, which deals with historic changes in labor turnover rates, leans heavily on earlier, well-known studies. The author's conclusions may be summarized as follows: (1) in the years before 1910, for which only the most limited data are available, turnover rates were generally high in periods of prosperity and low in periods of depression; (2) quits made up the bulk of all separations in this period, and variations in

numbers of accessions followed the course of these changes in quit rates; (3) rates varied widely in different plants and localities, being generally lower among skilled workers and those with long service and higher among unskilled, short-term employees; (4) rates rose to almost twice their earlier levels during the first World War; (5) after 1921 variations in separation rates lagged several months behind changes in accession rates; and (6) although rates were not appreciably higher during the depression of the 1930's than they were during the prosperous 1920's, most separations in the latter period were initiated by employers, and there appeared a negative correlation between numbers of separations and of accessions.

Part II is concerned with the duration of unemployment as exhibited by the distribution of unemployed, classified according to the length of unemployment. By analysis of a number of samples, surveys, and censuses, together with Bureau of Labor Statistics reports on labor turnover, the author arrives at the following conclusions: (1) there was a general tendency to underestimate the numbers of recently unemployed in most enumerations prior to 1930, but this error disappeared after that date; (2) continuous unemployment for more than six months did not become common until the depression of the 1930's; (3) unemployment rose to new heights in the depression of the 1930's because of increased duration of individual unemployment rather than because of any increase in separation rates; (4) there appeared a new and pronounced differential in turnover rates between short-term and long-term unemployed; and (5) there was thus distinguished a short-term "turnover" group and a long-term "hard core" of unemployed.

Part III presents the author's conclusions with respect to so-called "secondary" unemployment, that of "additional workers" or "forced entrants" who become candidates for employment only when the usual breadwinner in the family unit is without employment. The section describes variations in the numbers of these additional workers in several phases of the depression stage of the business cycle. On the basis of analysis described in this section, Woytinsky concludes that: (1) all estimates of unemployment that assume a linear growth in the labor force throughout each year fall into error on this account; (2) statistical methods may be applied to historic data provided by unemployment censuses and surveys to develop satisfactory estimates of the numbers of forced entrants among the unemployed; (3) estimates of unemployment in the nation or in selected localities, when subjected to statistical analysis, suggest that the ratio of such secondary job-seekers to usual

workers has varied from about one to four to one to seven in various stages of depression; (4) secondary unemployment may thus be estimated as having amounted to some 120,000–150,000 in 1930, 650,000 in 1931, and 1,000,000 in 1937.

The volume clearly evidences extensive and intensive analysis of existing data. As the author recognizes, however, its findings must necessarily be regarded as hypotheses rather than as conclusions. That is true in part because of the limitations of original data. Both labor turnover and employment or unemployment figures are meager for several of the periods included in the study. Moreover, even for the most recent periods, this reviewer would raise serious question as to their representative character. Further, there are a number of appropriate questions as to the effectiveness of the methodology developed and utilized by the author. Some of these questions have already been raised in earlier issues of the *Journal*. The reviewer would stress the fact, recognized by the author on page 114, that only analysis of individual cases can clearly demonstrate the "forced" nature of entrance into the labor market. Further, the application of probability analysis based on variations in the numbers of multi-worker families implies a distribution of primary unemployment that may or may not be realistic. Real question may be raised as to the assertion that "there can be no direct causal correlation between the number of workers in a family and their chance for employment" (p. 126).

The author is, however, aware of these limitations. He indicates that the reader must decide for himself whether the interpretation is plausible (p. 128). And there can be no question as to the provocative qualities of the findings nor the possible significance of their implications for public policy. The volume outlines a field of investigation that will doubtless be subjected to further analysis and possible verification of present findings. In doing so, it makes a valuable contribution to the literature of labor economics.

DALE YODER

University of Minnesota

The Swedish Collective Bargaining System. By PAUL H. NORGREN. Cambridge: Harvard University Press, 1941. Pp. xv+339. $3.50.

It is fortunate that Dr. Norgren was able to make this study of the Swedish system of collective bargaining while the system was still operating in the relative freedom of the pre-war years. During that

period much attention was devoted to the evidences of economic progress in Sweden. This progress coincided with the existence of a strong and extensive labor movement.

It has been Dr. Norgren's purpose to demonstrate what factors have contributed to this coincidence and to outline very specifically the industrial agreements and operating techniques which have been developed. Among the factors to which he makes reference are the compulsions placed upon trade-unions operating in an economy in which the competition of foreign trade is an important element; the high degree of organization among employers, paralleling that of the unions; the relatively high degree of control and influence exercised by the central bodies on both sides of the bargaining table; the widespread use of national agreements and the naturally resulting general character of those agreements; the relative absence of provisions restrictive on production and the encouragement of incentive wage systems, even in the building trades, where, in this country at least, they have been thought to be least applicable; the existence of a mutual respect and a lack of fear for each other on the part of labor leaders and management; the recognition on the part of both groups of the realistic impact of their decisions on the total economy; and this practical assumption of responsibility coupled with a firm but restrained insistence on maintaining a maximum advantage in economic rights, even if this leads to a test of strength through the lockout or strike. Back of the intra-industry machinery for determining and administering the terms of the labor agreement is state machinery for adjudication of disputes which cannot be handled by the former and state prohibition of any strikes or lockouts stimulated by intra-agreement-period disputes.

The discussion of how these basic characteristics have developed is detailed and clear. The author has not only a thorough grasp of the literature and records but that sense of reality and absence of evangelism which comes when an impartial student studies, in the field, the facts he is attempting to interpret. The strength of the book and its value to management and labor in America, where the collective determination of the terms of industrial relations is not traditional over wide areas, is in this demonstration of how a system of industrial jurisprudence can develop and provide an effective and relatively peaceful alternative to open conflict; how such a system can provide a trial of strength no less real and decisive, although less destructive of economic efficiency, than the open and bitter class warfare which has so frequently characterized American industrial relations. Yet it is evident

that this struggle within the bounds of law has been a slow development. American employers and labor leaders will do well not to assume that here will be found a pattern ready made for American industry. Dr. Norgren has placed in their hands, however, the record of adjustments, worked out in Sweden by realistic men, to the realities of economic and human factors, which are in many respects similar to those faced by American industry.

The author has added brief comments on the economic effects of collective bargaining on national income, economic status of the workers, profits, management efficiency, and productivity. These comments are interesting, coming from one whose contact with the facts has been so close, but they are by no means as adequately grounded in evidence as the discussion of the development and present techniques of collective bargaining. The latter stands as the outstanding contribution of this very timely book.

E. WIGHT BAKKE

Yale University

Exchange Control and the Argentine Market. By VIRGIL SALERA. ("Columbia University Studies in History, Economics and Public Law," No. 485.) New York: Columbia University Press, 1941. Pp. 283. $3.50.

For the elaboration of plans to rehabilitate world-trade after the war, nothing is more relevant or timely than recent commercial history. Dr. Salera's examination of the international trade of Argentina under exchange control from 1931 until after the outbreak of war shows in a dramatic way how England and the United States will have to mend their own ways if they are to lead the way to economic peace and prosperity. For though many of the features of Argentina's commercial and exchange policy were ill-advised, the evidence of this book shows how responsibility rested in large measure upon English bilateralism and American protectionism.

Exchange control was introduced in Argentina, as in so many other countries, shortly after the devaluation of sterling in the autumn of 1931. As in so many other cases, the control was the answer to a flight of capital; and there appeared in this early phase the characteristic ineffectiveness of administration, the unfavorable turn in the balance of payments attending overvaluation of the currency, and the beginnings of bilateralism and of discrimination in commercial policy. The end of this first, somewhat experimental, phase was prepared by the Roca-

Runciman treaty of May, 1933, which in section 1, article 2, sequestrated the proceeds of British imports, after deduction of a "reasonable sum" to meet Argentina's foreign-debt service, for the payment of British exports to Argentina. Salera believes that the pressing necessity of a stabilization loan from London prompted this far-reaching concession; but it "reduced Argentina to something close to an economic vassal" of England; and other South American countries were impelled to try to imitate the British model.

A second phase of exchange control began in November, 1933, with the requirement of import permits and the institution quite openly of bilateralism. Simultaneously the official rate of the peso was changed to recognize a 20 per cent depreciation, though actual depreciation exceeded this margin by a third; the black market for exchange was accorded some legal recognition and came to be a sort of safety valve, "permitting capital flight and other transactions for which prior permits would be unavailable"; and the spread between buying and selling rates was increased, enabling the exchange control to derive a profit used to subsidize certain exports. Commercial discrimination appeared on the export side through subsidies on commodities only irregularly salable abroad and on exports to countries bordering on Argentina. On the import side, the most notable characteristic was the favorable position accorded to England in the allocation of exchange for payments. In the revision of the Roca-Runciman treaty in 1936, England imposed customs duties for the first time upon meat imports and required substantial concessions to British investors in the Argentine.

In November, 1938, it became necessary for the Argentine exchange authorities to abandon the artificially low official selling rate of 16 pesos to the pound; but to offset the disadvantage to English exporters, the authorities imposed a universal system of import quotas decidedly favorable to Britain. This new device marks a third period in Argentine exchange control. The chief victims of this move were exporters in the United States, though they had also suffered from the earlier measures. Salera presents an exhaustive statistical and analytic review of the relative position of the United States in Argentine imports over the period since 1925, showing graphically the results of the Argentine exchange and commercial policy.

The author concludes with the observation that there seems little hope that England would voluntarily abandon her preferred position, and, upon this basis, sees no solution for Argentina but the retention of exchange controls and quotas. The book was concluded before the

Atlantic Charter, and we may hope that the author's pessimistic prophecy will not have to be fulfilled. This hope is based upon the possible role of the United States, which, according to Salera, "happens to be the only important trading partner possessing the freedom of action required to grant practicable but by no means painless concessions sufficient to make worth while Argentina's renunciation of the narrow bilateralism which has been so injurious to America's position in this South American market."

It is regrettable that Salera should have cloaked his carefully elaborated economic analysis in a particularly shabby raiment of expository style, idiom, and even grammar. On pages 47, 109, 194, 227 (twice), and 229, pronouns, phrases, or clauses have wrong grammatical references; erroneous use of words is frequent: erudite (p. 34), blatant (p. 63), provided (p. 87), narration (p. 100), transpire (p. 103), broaches (pp. 119, 203), abetted (p. 219), whose (p. 229), emerged (p. 233); and the instances of sentences tortured from the angle of clarity and euphony are too numerous to enumerate. If it were not true that no sharp line divides substance and expression it would not be necessary to stress these matters. Note, for example, Salera's sentence: "The italicized portions of the text of the letter are not in the original" (p. 119, n. 46). Does the publisher of this book simply print without reading?

HOWARD S. ELLIS

University of California
Berkeley

German Control over International Economic Relations, 1930–1940. By ALLEN THOMAS BONNELL. ("Illinois Studies in the Social Sciences," Vol. XXVI, No. 1.) Urbana: University of Illinois Press, 1940. Pp. 167. $2.00.

Except for a historical introduction (pp. 11–29) and a concluding chapter on "Effects" (pp. 115–41), the bulk of this study consists of abbreviated excerpts from laws, ordinances, international treaties, etc., regulating Germany's economic relations with the outside world in the 1930's. The material is neatly organized under three main headings: standstill and devisen control (pp. 30–52, 53–74); import control (pp. 75–92); and export stimulation (pp. 93–114). What is, however, the purpose of such a compilation? A summary survey of the manifold legislations and regulations, which does not go into their legal aspects, does not show the technical functioning, and does not study the economic con-

sequences or implications, may be commendable as a classroom product but serves no scientific or practical objective. True, the concluding chapter discusses superficially currency stabilization, foreign debts, and the balance, terms, character, and direction of international trade, but it consists of undigested statistical tables and cursory remarks which do not reach beyond commonplaces. The conclusion that "the effect of control measures must be measured in the light of what Germany expected to achieve through them" rather than on the assumption of "perfect or near perfect international economic equilibrium" (p. 140) is very true indeed, but it does not amount to more than a *pium desideratum* in no way substantiated by research and analysis.

MELCHIOR PALYI

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and
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Investment Banking under the Securities and Exchange Commission. By T. KENNETH HAVEN. ("Michigan Business Studies," Vol. IX, No. 3.) Ann Arbor: University of Michigan, 1940. Pp. 154. $1.00.

To the many who have been awaiting more precise information on certain phases of security underwriting since the advent of federal regulation than is available in the usual sources, this monograph will be welcome. It is not an all-inclusive discussion of the impact upon investment banking of the several regulatory acts and the multitude of commission rulings under them, with a careful segregation of the effects of each. Rather, it is an analysis, for the most part statistical or factual in nature, of how investment banks have fared in the regulatory climate of the years 1933–37 and 1938, with special emphasis upon such matters as underwriting commissions on issues of different investment quality, underwriting costs, underwriting losses, and the rate of return on capital invested in the investment-banking business. In addition, there are separate short chapters on competitive bidding, private placement, security options to underwriters, and new types of underwriting contracts.

Among the more important conclusions reached by the author is that underwriting commissions, which varied inversely with investment quality and averaged 2.68 per cent for all issues sold during the period, were not excessive. Underwriters' charges have fallen noticeably in the last twenty-five years, and profits (based on data for only

five investment banks) have been highly variable and sufficient to yield an average return of only 8 per cent on invested capital during the five-year period 1935–39, inclusive. The necessity for adequate commissions on successful issues is emphasized by his interesting finding that 20 per cent of the bond and preferred stock issues offered from 1933 through 1937 failed to be completely sold at offering prices.

He also finds evidence of active competition in underwriting, and of the absence of banker domination of issuers. Reasonable underwriting spreads and the readiness with which a sizable number of issuers switched from the sale of securities through underwriters to direct placement indicate effective competition and issuer independence. He detects little need for enforced competitive bidding and believes that such may be harmful to the small issuer and to the investing public.

Many recent changes in economic life and in financial arrangements appear to Mr. Haven to be permanent, and he advises investment bankers to make readjustments, particularly those designed to court favorable public opinion and to strengthen their position against the private placement of securities. The first might be accomplished by laying all the cards on the table and by establishing self-imposed professional standards, with severe penalties for infractions of the professional code; the second, by inviting large institutional investors to participate in distributions on a favorable basis, similar to the English practice. He also emphasizes the vital need for a more tolerant and helpful attitude on the part of regulatory agencies.

The study gives evidence of thorough and comprehensive search of original sources, supplemented in some cases by information derived from direct correspondence. Mere mention of the fact that, after considerable culling, 665 issues were investigated for part of the basic study gives some idea of the magnitude and scope of the author's research. Unfortunately, because of lack of data, parts of the study, e.g., those pertaining to the rate of return on capital and to underwriting losses, had to be based upon less complete factual information (a deficiency which the author would have investment bankers remedy), but even here he has plowed almost virgin soil and achieved some interesting and suggestive results. Those who would improve their understanding of contemporary investment banking will find the statistical findings and the generally well-balanced analysis of the author to be well worth while.

CHELCIE C. BOSLAND

Brown University

Robert Dale Owen: A Biography. By RICHARD WILLIAM LEOPOLD. Cambridge: Harvard University Press, 1940. Pp. xii+470. $4.50.

The Incorrigible Idealist: Robert Dale Owen in America. By ELEANOR PANCOAST and ANNE E. LINCOLN. Bloomington: Principia Press, Inc., 1940. Pp. 150. $2.00.

The son of a more famous father, Robert Dale Owen has until recently been neglected by biographers. Yet he is an interesting and in many ways a typical figure of early American pioneering in the fields of social reform. Now, in a single year, two well-documented biographies have appeared.

Of the two, the one by Leopold is by far the more definitive work. It is thorough, comprehensive, and put together with rather unusual clarity. By comparison, the Pancoast and Lincoln volume, scarcely over a hundred pages of text, suffers somewhat from overcompression. It also suffers from a certain lack of adequate contact with its audience. For instance, while the authors purposely leave out all account of Owen's youth (on the score presumably that it is already well known through other sources, notably Owen's own *Threading My Way*), they never quite succeed in making up for this gap afterwards. When all this is said, however, the little volume remains scholarly and useful.

Taking the two biographies together, the picture emerges of a man always bent upon humanitarian improvements but changing very much in varying environments. First we get the all-out reformer, intent upon free thought and women's rights, and for a time making the universal free maintenance of school children his panacea. Then we get the practical man of the Indiana legislature and later of Congress, satisfied with strictly limited reforms, still in the same fields of education and women's rights, but working for them with untiring perseverance. In the latter part of this period we see him, in spite of his Indiana anchorage, gradually swept into the current of slavery reform, ending, after the Civil War had once begun, in full partisanship for compensated emancipation. By 1863 we find his antislavery pamphlets famous. And finally we find the aged man, like his father before him, turning to spiritualism.

Both volumes, it seems to the present reviewer, miss something of an opportunity to compare fully the likenesses and differences of the two Owens, father and son. Both seem to feel the need to traverse with faithfulness the less interesting portions of Owen's life, such as his career in spiritualism and his period of service as minister to

Naples; and neither, for lack of adequate treatment of the economic situation of the times, does full justice to the significant early episode of Owen's disappointing relations with the Workingman's party of New York. Perhaps the most interesting portions of the biographies are the passages, found chiefly in Leopold, that quote Owen *in extenso* with only a ribbon of text. There is his quaint marriage compact, faithful wholly to women's rights. There are his principles as one of the organizers of the Smithsonian Institution, showing the practical turn of his democratic policy in education and the contrast between it and the views of his associates, which finally prevailed. (Smithson's deed had called for "an establishment for the increase and diffusion of knowledge among men," and Owen wanted to emphasize the diffusion, to include "works in popular form on agriculture . . . . , the sciences, manuals explanatory of the best systems of common school instruction . . . ."). There are Owen's frank self-characterizations ("Each man can only do a certain amount of good in this world"). And there is finally the beautifully characteristic titling of two articles by the two Owens, father and son, appearing in the same issue of the same daily paper in 1846: Robert Dale Owen, "Report of the Organization Committee of the Smithsonian Institution"; Robert Owen, "A Few of the Innumerable Reasons for an Immediate, Entire Change of the Existing System of Society in the United States, in Europe, and over the World."

DOROTHY W. DOUGLAS

Smith College

The Crisis of Our Age: The Social and Cultural Outlook. By PITIRIM A. SOROKIN. New York: E. P. Dutton & Co., Inc. 1941. Pp. 338. $3.50.

This book represents an effort on the part of the author to popularize the theory of history contained in the three volumes of his *Social and Cultural Dynamics* published in 1937 and the fourth volume of 1941, and to apply the theory specifically to the interpretation of recent and prospective events as suggested by the title. A part of the content is derived from lectures given in the past couple of years. The attractiveness of the presentation is not increased by the condescending and patronizing attitude of the author toward critics and others who may disagree with his views. But the content embodies an interesting scheme for historical and social interpretation, and it is devel-

oped in an interesting manner. The whole is interspersed with much historical information and literary and artistic lore.

Following an introductory chapter on "The Diagnosis of the Crisis," some two-thirds of the book is taken up in consideration of various aspects—the crisis in the fine arts; in science, philosophy, and religion; in ethics and law; in government, the family, and economic organization; and in crime, war, and disease itself (chaps. ii–vii, pp. 30–239). The last three chapters elaborate the diagnosis, the last part of the last dealing with "The Way Out and Beyond."

The main idea of Sorokin's cultural dynamics is now fairly well known to the public which takes an interest in such matters. It is a cyclical interpretation of history, chiefly European history, and especially the medieval and modern phases, in terms of oscillation between "ideational" and "sensate" culture patterns or types, with recognition of "idealistic" as an intermediary form. The general meaning of these categories is sufficiently indicated by reference to the high Middle Ages as an example of the ideational and of modern Western civilization as sensate, together with the meaning of the two terms in general usage. In the judgment of the reviewer (which he himself does not regard as of any great value), it probably has as much validity as any simple formula covering the grand sweep of history has or can have. The main thesis of the present book is that the crisis of our age, while revolutionary and catastrophic, is only a transitional phase in the history of Western culture as a whole, not its destruction. We are not to oppose the change but to welcome it, in the light of the obvious defects of current social life. After transitional difficulties (*dies irae, dies illa*), progress will be resumed through a shift of culture to another basic form, "from the agonizing sensate to the ideational or the idealistic or the integral."

The logic of the position is, of course, that if winter comes spring cannot be far behind, which would also prove that the more years a man lives through the more certain he is to live through the next year. It seems rather too bad that "The Wave of the Future" had already been pre-empted by another author as a book-title formula for predicting a historical transition to a new and higher system of values. An ideational or idealistic culture might be defined as one of stable social stratification in which an intellectual élite lives on the "choice cuts" as the natural remuneration for depicting and extolling the virtues of poverty and ignorance and devotion to "spiritual" values. A

"sensate" culture believes in progress and amelioration and the diffusion of the fruits of progress among the whole population. But it also believes in freedom as its cardinal ethical principle; and this has had the unhappy consequence that a large part of our intelligentsia has lived by preaching to the "workers" that amelioration of their lot is far too slow—indeed, that they have nothing to lose but their chains as a consequence of violent revolution; and too many of them have been too ready to listen to this preaching and act upon it. The great practical difference between the two forms seems to lie in the fact that a society is not likely to be destroyed by conservatism, as long as there is a reasonable unanimity in accepting that ideal, but that the attempt to progress may have exactly that result if efforts are not both harmonious and intelligently directed.

FRANK H. KNIGHT

University of Chicago

The Roots of National Socialism. By ROHAN D'O. BUTLER. New York: E. P. Dutton & Co., Inc., 1942. Pp. 304. $3.00.

In seeking to reveal the roots of Nazi Germany, Professor Butler has done a truly important service to all who would understand the seemingly insane world in which we live today. He has demonstrated by a judicial survey of German problems, thought, and practice since the Reformation not only that National Socialism has deep roots in German life-history but that it is in effect a Germanic sociopolitical philosophy in direct conflict with the Anglo-French tradition in which we have grown up.

The important thing to remember about Germany is that there has been no Germany in the sense that there was a France and an England or even a Spain and a Russia. "Germany" was simply the north-central portion of Europe that constituted the battleground of other nations' ideas and armies for many centuries. The German lands had no natural boundaries, no unity, no common culture, no military power, no economic success, and no common religion. They were surrounded by countries that had most of these if not all. They were Europe's stepchildren and developed a marked inferiority complex. And modern Germany is explained in large part by the fact that Prussia rescued the German states from their ignominious position and set them on the path that led to direct conflict with the established order of Europe and its tradition.

German economic thought goes back to Herder, but Johann Gottleib Fichte is the Adam Smith of German economics. Fichte wrote *Der geschlossene Handelsstaat* in 1800, just twenty-five years after the publication of Adam Smith's *Wealth of Nations*. He deliberately contradicted almost everything Smith stood for. He suggested a total national autarchy, a planned economy, quota systems, concealed inflation, a blocked currency, state barter agreements, artificial production of substitutes, intensive armament, living-space, forcible occupation of territory, co-ordination of such occupied territories, transfer of populations, and an exaggerated economic nationalism.

It is significant that Fichte's economics won wide acceptance in Berlin from 1806 to 1808, while the French armies were sweeping across Germany. Unquestionably Fichtean economics represented a defeated and retreating people seeking survival within itself in the presence of a conquering foe. In 1807 Prussia was dismembered, forced to pay heavy indemnities, forbidden an effective army, and subjected to French military occupation. First Prussia had to pull herself together by conscious, totalitarian effort; then she had to unite Germany by freeing the German states from the fear of her neighbors and the ignominy of conquest.

In the early 1830's Friedrich List returned from America to promote railroad-building and the German customs union and further to develop German economics. In *Das nationale System der politischen Ökonomie* in 1841, List set himself up against the classicists. "The system of the school suffers," he wrote, "from three main defects: cosmopolitanism, which neither recognizes the principle of nationality nor takes into consideration the satisfaction of its interests; . . . . materialism, which everywhere regards chiefly the mere exchangeable value of things without taking into consideration the mental and political, the present and future interests and the productive powers of the nation; and disorganizing particularism and individualism. . . . ."

Thus Europe can be said to have produced by the middle of the nineteenth century two complete and contradictory economic theories; the classical and the German—one centered about the individual and the other about the nation. Each system left a question to be answered. For the classicists the question was, "Who is the individual?" and for the Germans, "What is the nation?" For the classicists the individual was first the businessman and only later the wage-earner and consumer. For the Germans the nation was first the German states, then a superstate including Holland, Switzerland, Belgium, Denmark,

and Austria, for a national economy needed wide and varied territory. And finally Germany needed colonies, *Erganzungsgebiete*, "as much as breath."

On June 18, 1871, William of Prussia was crowned German emperor in the Hall of Mirrors at Versailles, and the aim which had dominated German thought for a century was achieved. But a force had been created in the process which could not be stopped with the accomplishment of its objective. Imperialism followed, carrying liberals and socialists along with it into World War I.

World War I served to reinforce the teachings of Fichte. During the war, because of the blockade, Germany actually was a "closed commercial state." In Friedrich Naumann's words, "The enemy thought to do us evil, but God, the God which Fichte believed in and taught, thought to do us good."

Thus again in defeat Germany has sought to cure her soul by revival and new attempts at conquest. Hitler is the logical result of the long failure to satisfy the egotism of a proud but pitiable and dangerous people.

NORMAN J. WARE

Wesleyan University

The Clarks: An American Phenomenon. By WILLIAM D. MANGAM. New York: Silver Bow Press, 1941. Pp. ix+257. $2.50.

This short book contains the narrative of the life of a Montana copper king and the escapades of his children. It does not pass judgments but by insinuation and innuendo blackens almost every character dealt with.

For western history generally, or for Montana's history, the work contains few if any new facts of importance. An animus runs through the book—that the Clark family, which made so much money out of mining in Montana, gave so little to the good citizens by way of charity. The author's explanation of why the disreputable younger son gave nothing is that he had taken care to commit no crime in that state and therefore had nothing to cover up! By the same token, the father should have passed out beer and provided skittles in plenty, for, according to the author, his political crimes were numerous.

For American political history the book is of little value, because the story it tells can be found elsewhere and is well known to students of politics, particularly in Montana. In brief, a copper magnate wanted to be a senator in Washington. The voters and politicians wanted his

money. Both sides won. Clark's politics reflected the political standards of his time, and little besides this is to be deduced from his experience.

The chief strength of the book should lie in its business history, for the central figure was, after all, primarily a businessman. W. A. Clark (1839–1925) went west to make his fortune. After some success in Colorado silver, Clark invested some of his money in a store and a bank. He was more of a businessman than most miners, as is evidenced by the fact that he kept a reserve of cash. His chief success began in 1872, and his richest mine (copper) was the United Verde. Some sharp deals are suggested that are not proved. The businessman is criticized for his wealth and power, his lack of interest in humanity (i.e., hungry neighbors), and the fact that he had "no great friendship" (was not a good fellow) and lived in "a deep and narrow world of his own" (politics, art, and foreign travel). The author was well qualified and favorably situated to dig out many facts of great value, but, instead, he strings out a few more or less disjointed though important statements.

The book rises to its greatest height, or lowest depth, as social history. Its climax is reached in the misuse of wealth and leisure by the children of a rich man. The evil influence of Paris is made clear. Presumably this bit of revived muckraking is to be further evidence of the evils of large fortunes. The editor, Professor E. A. Ross, says that this book may "launch a new model of biography, viz., *social* biography. I mean the account of a man's life, performance and influence, not from the point of view of his family, friends, or satellites nor yet that of his opponents or detractors, but strictly with reference to their *social* significance."

Here is a situation of great import. A professor of some distinction who disclaims responsibility for facts—"for not one of them do I vouch"—is ready to start literature of "social significance," based on a book which can have no standing in a court of scholars. There is grave danger that our universities shall become out-and-out centers of propaganda rather than of learning.

Just why Mr. Mangam wrote this book is unknown to me. As a good Montanan, he felt that the Clarks had dealt shabbily with his state. As a former associate of W. A. Clark, Jr., he seems to have felt that he should have been included in the bequests so liberally made to friends (pp. 229–36). The beneficiaries are by subtle wording put down into the lowest categories of human beings.

The book is such a mixture of fact, fancy, inference, gossip, news-

paper reporting, and malicious presentation as to be worthless as history and drab as fiction. The author only occasionally reveals his sources—apparently chiefly newspaper articles and family letters. Where he found these letters or, what is more important, where we might read them *in extenso* is not told.

N. S. B. GRAS

Harvard University

Freedom of Thought in the Old South. By CLEMENT EATON. Durham: Duke University Press, 1940. Pp. xix+343. $3.00.

This volume "offered as a case history in the record of human liberty and intolerance" attempts to trace the course of the ante-bellum South from eighteenth-century liberalism under Thomas Jefferson to "the suppression of radical criticism" under John C. Calhoun. Freedom of thought is not defined. From the contents of the work one would conclude that it meant only the right to skepticism in religion and freedom to criticize Negro slavery. Little else is more than mentioned.

The book opens with a somewhat romantic description of eighteenth-century aristocrats and their way of life—the Carters and Byrds of early days and the Madisons and Jeffersons of later times. These men could be deists; the few could even flaunt their "unbelief." In Revolutionary times, when political and social theory was widely discussed and when agriculture dwindled and changed its character, they dared to criticize slavery and to foretell its ultimate passing. They developed the plantation system, where good living, gentle manners, and respect for things intellectual flourished.

When these men left the stage dark days began in the South. Illiteracy and indifference to education for the masses and a constant fear of servile insurrection joined to check discussion of slavery; northern attacks on the institution brought an active campaign to stamp out all criticism. Southern laws were made harsher and harsher. The few who dared to speak as did Jacob Gruber, Daniel Worth, and Moncure Conway were hauled before the courts or driven from their homes. Newspapers were attacked, and sometimes an editor like James Birney was forced to leave the South. College professors sometimes suffered the same fate, and a movement developed in the late ante-bellum period to keep all southern boys home from northern universities.

Skepticism in religion declined along with the right to criticize slavery. For his "unbelief" the good Thomas Cooper lost his chair at the

College of South Carolina. The Unitarian church dwindled in the period. The Bible defense of slavery was perfected and widely propagated. By 1860 an intellectual blockade had been established about both slavery and orthodoxy.

Professor Eaton's book, in spite of the evidence of much painstaking research, is far from convincing. Few Americans, in that period or afterward, were notable for their liberalism in matters religious. Rural belts, whether they were in the North or in the South, tended to fundamentalism. The expanding frontier in both sections strengthened their influence. The existence of a few Carters or Jeffersons did not indicate that the masses about them were liberals. If attention were centered on the common people of the early period exclusively, as it is in the later period, the picture would be sharply altered. If attention were given exclusively to the liberals of a later day, the result would be the same. A like survey of northern conditions would yield little that differed from the South. Furthermore, criticism of slavery was a threat to the security of property. It was also a threat to social security. Has any large group of Americans ever been liberal toward either of these threats? In fact the number of liberals discovered in the antebellum South by Professor Eaton is surprisingly large. Few American regions have ever contained so many in so short a period of time in all their history.

This volume is an interesting example of what history becomes when sections are studied as though they had existed in a vacuum. Everything is unique. Everything becomes distorted. Freedom of thought in the South has no meaning when it is divorced from freedom of thought in the North and West at the same time. It has less meaning when slavery is not considered to be a part of American labor as a whole or when one class in a section or a period is compared to quite another class in another. Professor Eaton's book is quite sound in fact and detail; it is highly faulty in both method and conclusions.

AVERY CRAVEN

University of Chicago

Soil Exhaustion and the Civil War. By WILLIAM CHANDLER BAGLEY, JR. Washington: American Council on Public Affairs, 1942. Pp. xi+101. $2.00.

The thesis put forward in this monograph is that soil exhaustion was a primary factor in producing the American Civil War. The author bases his contentions on the fact that southern soils were always

subject to heavy depletion, on the theory that slavery prevented the use of conserving methods, and on the supposition that northern curtailment of slavery expansion brought the sections into conflict.

There are several serious things wrong with such a thesis. In the first place, soil depletion was not, and never has been, a peculiarly southern thing. All new American regions developed a single cash crop and spent their soils as lavishly as possible in order to get ahead. Concentrated rainfall, difficulties in growing grasses, and the superabundance of harmful micro-organisms made the problem of conservation more acute in the South, but it did not confine it for any particular reason to that section. In the second place, "soil exhaustion" began long before slavery was introduced and continued long after it was abolished. Some of the best farming and soil-building ever done in the United States were done with slave labor in Virginia and Maryland during the last years of the ante-bellum period. Furthermore, the plantations which made use of slaves usually were superior in this regard to the farms about them tended by white men.

More damaging to the thesis is the fact that in the struggle over slavery expansion the South contended for a principle and not the actual expansion of her institution. Only two of the southern members of Congress who spoke on Douglas' Kansas-Nebraska bill thought that slavery would be extended by it. All the others, some fifty in number, said emphatically that it would not be. The southern press took the same position. As the *Macon* (Ga.) *Telegraph* put it: "The bill will not give the South a single inch of slave territory." Others, like J. H. Hammond, were equally insistent that slavery already had more territory than it could consolidate and occupy. Nowhere in the section was there any aggressive need for more land.

The thesis, therefore, breaks down at every point. It shows the danger in attempting to explain a movement as complicated as the coming of the Civil War by any single force or group of forces. It also shows the danger of attempting to write history without an adequate knowledge of facts.

AVERY CRAVEN

University of Chicago

I Concetti statistici dell'analisi economica. By FELICE VINCI. Bologna: S. A. Nicola Zanichelli, 1941. Pp. 96. L. 12.

This little book contains the text, duly amplified, of an inaugural lecture in the University of Milan, to which Professor Vinci has been recently appointed in succession to Professor Mortara, who was

"purged" in 1938 and whose loss to Italy has since become Brazil's gain.

Professor Vinci presents some simple but interesting tools, which he suggests may assist in handling statistically a number of problems, such as "self-sufficiency," the outcome of labor disputes, the measure of the external purchasing power of money, and the "mortality" of business corporations. He also lists some hundred economic propositions which are stated to be capable of statistical determination.

No objection can be offered to Professor Vinci's tools in themselves, but one or two reservations have to be made.

The changes in self-sufficiency of a market with respect to, say, wheat, are measured, according to Professor Vinci's formula, by an index of changes in the value of domestic wheat production (in terms of the price of the base year) divided by an index of changes in the aggregate value (in terms of the domestic price for the base year) of both production and imports. But it seems misleading to describe this as an index of changes in "self-sufficiency" unless it is assumed, which Professor Vinci fails to do, that production plus imports satisfy for each year the normal requirements of the country. In the lack of that assumption, one might speak of "self-sufficiency" even at a near-starvation level.

Professor Vinci also claims, on the strength of certain tabulations extending over a considerable number of years, that the labor courts set up in Italy for the settlement of disputes between individual laborers and their employers seem to adjudicate consistently in favor of the employees. There may be some truth in that contention. But to conclude, as Professor Vinci does, that the outcome of labor disputes in Fascist Italy is comparatively independent of business fluctuations and that thereby the strategical factor which increases the bargaining power of labor during booms, and of capital during depressions, would appear to have been eliminated, would require a different type of evidence. It would also involve a discussion of the disadvantages for the working classes of the "fiat" changes in wage rates which are periodically brought about by the Fascist government.

BRUNO FOA

Washington, D.C.

The Second Yearbook of Research and Statistical Methodology: Books and Reviews. Edited by OSCAR KRISEN BUROS. Highland Park, N.J.: Gryphon Press, 1941. Pp. xx+383. $5.00.

In this volume Professor Buros presents a "comprehensive listing of books on statistical methods, scientific method, social relations of

science, collective biographies of scientists, and general histories of science." Included are 346 volumes published since 1933 in the English language. Appended to each title is a number of selections from the published reviews of the study. Such selections were excerpted from 1,652 reviews appearing in 283 journals. Not infrequently, individual books are accompanied by ample quotations from five or more reviews.

Such a collection, frankly presented "in an effort to make reviews more accessible," warrants discussion of objective more than of content. Therefore, the following remarks are motivated more by Professor Buros' discussion in the Preface to the *Yearbook* than by the content of the volume.

A collection of reviews will at least serve the purpose to which all reviews are (or should be) devoted. Thus there is no doubt that the *Yearbook* will accomplish the following stated objectives: "To help students, teachers and librarians to select textbooks with greater discrimination; to point out the weak and strong points of particular books; to assist . . . . in keeping abreast of modern developments in monograph and textbook writing and criticism; to emphasize that there are usually marked differences of opinion even among the more advanced students of statistical theory in their appraisal of a particular book. . . . ." The advantages of having the reviews in one place should not be minimized. Even students having access to good libraries can seldom manage to read several reviews of the same book, and few persons working in a particular field—economics, say—will examine publications in the physical sciences for evaluations of the study being considered.

There is doubtless much virtue in the extensive reading of reviews both of the same book and of many books in related fields. One can question, however, whether the collection in the *Yearbook* will make "students and teachers of statistics more keenly aware of the inadequacy of much of what is now presented in textbooks and classes despite the fact that such statistical techniques are incorrect, inefficient and obsolete." There have indeed been marked advances in these subjects during recent years. Statistical methods are now being applied in an increasing number of fields of study, so that today they are of interest even to people working in music and religion as well as to the physical and social scientist. It is also true, as Buros claims, that despite these steps forward, outmoded statistical theory and techniques are still being taught and used. Textbooks which might have been written twenty years ago continue to appear. And even satisfac-

tory studies are too frequently reviewed by persons incompetent to judge the statistical methodologies involved.

But the *Yearbook* does not segregate for special emphasis those studies which most merit attention as significant contributions. There is no deliberate attempt to present longer excerpts and/or more reviews for such books. There is not even a selection of reviews which reveal some competency on the part of the reviewer. Instead, excerpts were chosen which would fairly represent the over-all evaluation of each reviewer, even though some of these reviews seem to have been written by persons who either were incompetent to appraise the book or were unwilling to speak frankly. The amount of space given each book "is in direct proportion to the number of evaluative reviews located and not necessarily to the importance of the book." The volume is thus not really oriented toward the development on the part of students and research workers of a critical faculty whose lack Professor Buros rightly emphasizes. However, there are not many short cuts toward reducing the lag between accomplishment in a field and the wide recognition and application of this accomplishment.

WILFRED MALENBAUM

Washington, D.C.

Methods of Correlation Analysis. By MORDECAI EZEKIEL. 2d ed. New York: John Wiley & Sons, Inc., 1941. Pp. xix+531. $5.00.

The second edition of Ezekiel's classic methods of correlation analysis has been awaited with impatience by many workers in the statistical field. There is hardly a book which has exerted so much influence on empirical studies by economic statisticians and in related fields using the techniques so lucidly presented in this book. Chapter xxiii of the second edition gives a survey of types of problems to which correlation analysis has been applied. It is in itself an eloquent tribute to the importance of the first edition of the book. Almost all the studies listed in the different fields owe a great deal to the ideas and methods presented by Mr. Ezekiel. The new edition brings no fundamental changes in the approach to the problem and the methods advocated. There is only somewhat more emphasis upon the distinction between the population and the sample.

Two new chapters have been added. One deals with the reliability of an individual forecast in time-series analysis (chap. xix). Some of the pioneering work done by Henry Schultz in his article on the standard error of a forecast from a curve is presented and applied to simple

and multiple correlation. The discussion of the use of error formulas with time series is by necessity somewhat sketchy and disappointing. The author, however, is not to blame for the fact that there is as yet no generally accepted solution to many of the problems connected with this very difficult question.

The other new chapter (chap. xvi) deals with short-cut methods of determining net regression lines and curves. It presents Mr. L. H. Bean's method with examples and applications both to simple and to curvilinear regression. An extensive bibliography on graphic methods is given.

Chapter ii, which deals with the judging of the reliability of statistical results, has been enlarged in view of more recent statistical developments. The same is true for chapter xviii, which deals with the determination of the reliability of correlation conclusions. The author has, however, presented mainly R. A. Fisher's point of view about fiducial limits and has (perhaps wisely) not gone into the more recent developments in the theory of estimation and the testing of statistical hypotheses as developed especially by J. Neymann and Egon Pearson, and by A. Wald.

The new edition of Ezekiel's correlation analysis is more useful than the old one and can be expected to exert even greater influence in the field of applied statistics. The changes made represent in general genuine improvements. It is to be hoped that the author will be able to incorporate in the third edition solutions for many as yet unsolved problems of correlation analysis.

GERHARD TINTNER

Iowa State College

Early Banks in the District of Columbia, 1792–1818. By JOHN JOSEPH WALSH. ("The Catholic University of America Studies in Economics," Vol. II.) Washington: Catholic University of America Press, 1940. Pp. viii+183.

This doctoral dissertation is a chronicle of commercial banks started in the District of Columbia before 1818. An introductory chapter traces banking's colonial beginnings and gives brief accounts of the Bank of North America, Bank of New York, Massachusetts Bank, and First Bank of the United States. The Bank of Maryland, nearest the District of Columbia, is ignored. There follow three chapters devoted to three banks: the Bank of Alexandria, eleventh bank in the country; the Bank of Columbia of Georgetown, opened to help finance construc-

tion in the new capital; and the Bank of Washington, still in operation today. A fifth chapter contains unrevealing sketches of ten banks that mushroomed after the death of the First Bank of the United States and also short accounts of the Washington branches of the Bank of the United States. A summary attempts to draw some conclusions from this hodgepodge. Dr. Walsh points out that all were commercial banks, none "wildcat"; all were eager for incorporation; the majority sold most of their stock for specie or its equivalent but rarely had sufficient specie on hand for redemption purposes; the par value of their stock ranged from $10 to $200 and averaged $25; dividends were usually about 8 per cent; most of the banks held government deposits and bought government securities during the War of 1812; and their length of life ranged from 4 to 131 years, two still being in operation. Largely or wholly overlooked are such points as the liability provisions, the early use of checks, the ratio of notes to capital, and reserve ratios. Bank statements for nearly all banks during the two years 1818–20 are included, but no standard procedure is followed in presenting them (resources sometimes appear on the right side, sometimes on the left [pp. 51, 81, 84, 121]), and Dr. Walsh has made no effort to analyze and compare them.

The material has been drawn chiefly from American state papers, commissioners' letter-books and proceedings, a dozen local newspapers, and sundry bank publications and reports. Studies of banking in this period are rare and deserve encouragement, so it is doubly unfortunate that Dr. Walsh's researches have produced such small fruit. Better results might have been obtained if more time had been devoted to fewer banks.

DONALD L. KEMMERER

University of Illinois

American State Debts. By B. U. RATCHFORD. Durham: Duke University Press, 1941. Pp. xviii+629. $5.00.

This book from its space allocations appears at first blush to be primarily a history of state debts. Careful reading, however, shows that the latter third, which deals with the legal, administrative, and economic aspects, contains contributions to public finance of equal importance with the well-documented history. These contributions are several. The chapter on the economic effects of state borrowing is lucid and is noteworthy for subjecting the usual theoretical approach to some inductive proof. The statistics available partly support the

theoretical expectations as to the effects of state borrowing and expenditures, and of debt retirement, in certain stages of the business cycle. Another statistical contribution is the development of an "index of debt burden," relating the net debt outstanding to the state's ability to pay. Another original proposal is for a debt limit expressed in terms of a percentage of average revenue receipts over a period of years (a roundabout but a more satisfactory limit than a percentage of the average operating budgets). These two latter ideas had been developed by the author in earlier articles but are properly included in this volume.

Other points of note are: a consistent application throughout the study of the regional approach (using Odum's grouping of states); demonstration of the difficulty of defining the content of state debts; an emphasis upon the need for better reporting of state debt; and proof from experience that constitutional debt limits serve a purpose despite methods of evasion. The chapter on Tennessee is a good case study in administration, showing that the amount of debt which can be satisfactorily borne is in part a function of the speed with which it is incurred. Other case material presented demonstrates the savings to states from use of the callable feature in their bonds.

The reviewer could find little with which to quarrel—if that is his function. At some points in the historical narrative, a stricter adherence to tabular presentation of the statistics would have hastened the flow of thought. In discussing borrowing versus pay-as-you-go the author, because of his strategic location, might have presented to excellent advantage comparative case histories of North Carolina and Virginia. His use of the term "principle" in setting forth principles of state borrowing is too loose. Consequently, his summary statement of principles (last chapter) is inadequate, given the wealth of material which he had developed. But these are minor criticisms when one looks at this volume as a whole.

The history is well done and is of importance to the economic historian as well as to the public finance student. A complete history is wisely not attempted. The eye is kept on major trends and main events. But the ramifications are followed where they will aid in developing principles and reaching conclusions for future debt policy-making and administration. Because of the author's breadth of interest, this volume is the most comprehensive treatment that has yet appeared on state debts. A part of his success is no doubt attributable to the fact that for several years he has been writing special articles in

this field. The present work is the fruition of a decade of mastering the many approaches so ably used.

A. M. HILLHOUSE

Graduate Training for Public Service
University of Cincinnati

Principles of Public Finance. By MERLIN HAROLD HUNTER and HARRY KENNETH ALLEN. New York: Harper & Bros., 1940. Pp. xx+672. $3.50.

A great difficulty confronting the teacher of public finance who desires to take account of recent fundamental changes in the role of government in economic life is to find a text which provides a satisfactory springboard for theoretical discussion. The necessity of presenting a vast amount of factual material limits severely the possibility of providing anything like an integrated discipline for those who are willing to fill in the details independently. The result is that many textbooks in public finance are rather heavy going and do not offer much incentive to the student to strengthen his understanding of theory.

The present work does not suffer from this fault. Through the use of a rigorous system of paragraph headings, the authors have succeeded in condensing and closely integrating their treatment of the problems of public finance. The style is excellent, and the lucidity of expression cannot fail to stimulate interest on the part of the student. As one might expect, this method tends to prevent the extended treatment of certain problems that specialists will be likely to consider desirable. For example, the discussion of the tax on undistributed profits (p. 415) must appear cursory to those who remember the variety of arguments attending this tax in 1936 and 1937. On the other hand, the view is reasonable that there ought to be a division of labor between the author and the instructor.

The advantages of the method adopted by the authors are emphasized in such a chapter as that on the "Taxation of Economic Surplus" (chap. xxiv). In a manner gratifyingly systematic, they present the single tax as a special case of the taxation of income not necessary to elicit economic effort. Through this approach they are able to lead into a brief discussion of the interesting issue of taxation of surplus and the problem of business stability. The issues are rather hurriedly sketched; but this disadvantage, in the opinion of the reviewer, is

more than outweighed by the fact that the instructor is thereby enabled to go into these problems without doing violence to the approach of the text. Thus in the present case, information may be added concerning the development of techniques designed to make maximum use of the principle of taxation of surplus in those countries, especially Germany, in which circumstances have required taxation to become an art.

Of particular interest at the present time are the two juxtaposed chapters on "Emergency Financing—War" and "Emergency Financing—Depression." Breadth is given to the treatment of war finance by reference to the policies followed by both the Allies and the Central Powers during World War I, and this comparative method is continued through the post-war and depression periods. The result is a combination of historical material and analytical treatment which is useful both to the student and to the general reader. Also helpful are the chapters on tariff history, legal foundations of taxation, and administrative organization.

The reader may feel that insufficient space is given to the theoretical aspects of public works. Whether or not one favors either compensatory or long-term public works programs, the great amount of attention devoted to the theory during the past few years by reputable economists makes desirable a rather extended treatment of the issues.

The text is accompanied by a pamphlet entitled *Personalizing Public Finance*,[1] which is intended to assist the teacher in formulating classroom questions.

KENYON E. POOLE

Brown University

The Taxation of Railroads in New Jersey. By HARLEY L. LUTZ. Princeton: Princeton University Press, 1940. Pp. viii+208. $2.50.

Professor Lutz's book should be welcomed by all students of railroad taxation, for they have long been astonished by New Jersey railroad taxation. This book throws much needed light on how and why these taxes were levied and, until they became intolerable, were collected.

The exposition begins with the academic tradition of historical approach. It shows that the methods adopted in the 1880's may not have seemed unreasonable then, but, with the passage of time and the addition of legal barnacles, both the law and its administration have be-

[1] *Personalizing Public Finance.* By Merlin Harold Hunter and Harry Kenneth Allen. New York: Harper & Bros., 1940. Pp. iii+48.

come impossible. Assessing officials were required to ascertain "true values" yet were given no definition of "true values," leading the assessing officials to engage in what Lutz aptly calls "shadow boxing" in an endeavor to comply with their conception of a law impossible fairly to administer.

The most interesting, from the standpoint of the student of railroad taxes, is chapter iii, "A Criticism of the *ad valorem* Theory of Taxation." Lutz rejects the concept of market value as out of the question, contending that there is no market value for a whole railroad. He rejects stock and bond quotations as not sufficiently comprehensive to be indicative of value. This reviewer would not go that far. Lutz would have the assessing officials use an informed guess at market value, arriving at that guess by laying more emphasis on cost and capitalized earnings than would this reviewer.

In the discussion of stock and bond plan, Lutz says that plan has little to recommend it. "At best it is simply another way to give consideration to the income factor" (p. 91). When both the stock and bond plan and the income feature are used to arrive at capital value, it does not, as Lutz implies, weigh the same income factor twice but weighs both past income and expected future income—very different things. This reviewer is heartily in favor of the emphasis on the fact that any *ad valorem* plan must first measure the value of the railroad system and then allocate that value to the states.

In the second to the last chapter the author makes the sage remark that *ad valorem* taxation can be used as applied to railroads but that it requires intelligence and vigor equitably to apply it. In the same chapter he recommends that a gross-receipts tax be levied. What does this imply? Lutz would solve the taxation of railroads in New Jersey by requiring them to pay about the same proportion of their gross receipts as is paid by other public utilities instead of some two and a half times as much, as they are now paying. A great many railroad-tax students and, I believe, Professor Lutz will agree that this is not the best possible plan, but it is far better than the one now in use, and possibly the only one likely to be adopted. It is a workable scheme.

Professor Lutz's book is to be recommended to all students of railroad taxation. Those in the field of political science may get an inside view of some practical problems in government by reading the book.

M. M. DAUGHERTY

University of Delaware

Stock Transfer Taxes: Report of the Committee for the Study of Federal and State Stock Transfer Taxes, Together with the Report of Paul Studenski. New York, 1940. Pp. xi+155.

A committee of "interested persons," with Senator Seabury C. Mastick as chairman, secured Professor Paul Studenski in 1939 to conduct an investigation of the federal and state stock-transfer taxes and their operation. Foreign as well as domestic taxes were studied. The history of stock-transfer taxes was traced, and their use for minor revenues was described. The research staff has assembled in the report useful data for the tax student in a clear and logical arrangement.

The committee found itself in agreement with the chief conclusions of the research staff. It accepted the following generalizations:

1. The stock-transfer taxes are levied mainly upon investment and speculation. When wisely levied, the taxes are equitable, productive of revenue, and do not have unfortunate effects.

2. The American taxes are aimed at speculation primarily. Their base is too broad, and simplification would be desirable.

3. The present rates of the American taxes are inequitable.

4. Serious duplication and conflicts arise from the joint use of stock-transfer taxes by the federal and state governments.

5. Trading in odd lots is taxed unfairly at rates which result in double taxation and unfair penalties.

6. The use of stamps in collecting the taxes complicates the administration needlessly and should be abandoned.

ALFRED G. BUEHLER

University of Pennsylvania

Principii di scienza della finanza. By LUIGI EINAUDI. 2d ed. Turin: Giulio Einaudi, Editore, 1940. Pp. xxviii+539. L. 50.

This is the second edition of Professor Einaudi's *Principles of Public Finance.* It differs from the first, which was published in 1932, in two major respects. Professor Einaudi has eliminated from the text practically every expression of his personal opinion, thus completing the task begun in the first edition. As the text now stands, it is altogether a description and analysis of the general principles of public finance as developed by leading scholars throughout the world. The Italian tax system and the controversies surrounding it are treated in a separate volume. Considerable old material has been dropped and even more

new material added, and nearly all the remaining matter has been carefully revised. There is in this edition an extended bibliographical note in which Professor Einaudi traces the development of the text and in which a limited number of references to other works is given. Reference is also made to the most relevant publications in which his own views on public finance have been expressed. A list of questions and exercises well designed to bring out the logic behind and to stimulate criticisms of the principles treated is included for the benefit of students.

The text is divided into three books. Book I deals with nontax revenues in the form of quasi-private, public and political prices, and special assessments. Book II opens with a discussion of theories of taxation and continues with an analysis of the principal types of taxes—their defects and their virtues. In discussing the effects of taxes, considerable emphasis is laid on the possible beneficial effects, which, of course, depend on the manner in which the funds are spent. Here Professor Einaudi notes that the first of modern economists to stress the importance of studying the manner in which tax funds are spent in judging their effects was De Viti de Marco and that the recent contributions of Americans on this subject are but particular expressions of De Viti's fundamental observation that taxes do not represent merely an added cost. Book III deals with extraordinary expenditures and the public debt.

Professor Einaudi has given us a carefully reasoned, well-organized, and clearly written book on the principles of public finance—one which should prove useful to American students of the science. It is not written from the Fascist point of view, as some might have expected, but is made to rest squarely on neoclassical economics. There is in the bibliographical note one pertinent remark that should be reproduced here. In speaking of one phase of contemporary economic thought, and specifically mentioning Mr. Keynes as its leading exponent, Professor Einaudi says that it is based on the "incredible illusion" that a planned or regulated economy is consistent with those institutions held dearest by the Anglo-Saxon world, namely, freedom of speech, freedom of worship, habeas corpus, the inviolability of the home, etc. In reading the signs of the times, it would seem that too many Americans are like the Arkansas hillbilly who could read "how fur, but not whar to."

DOMENICO GAGLIARDO

University of Kansas

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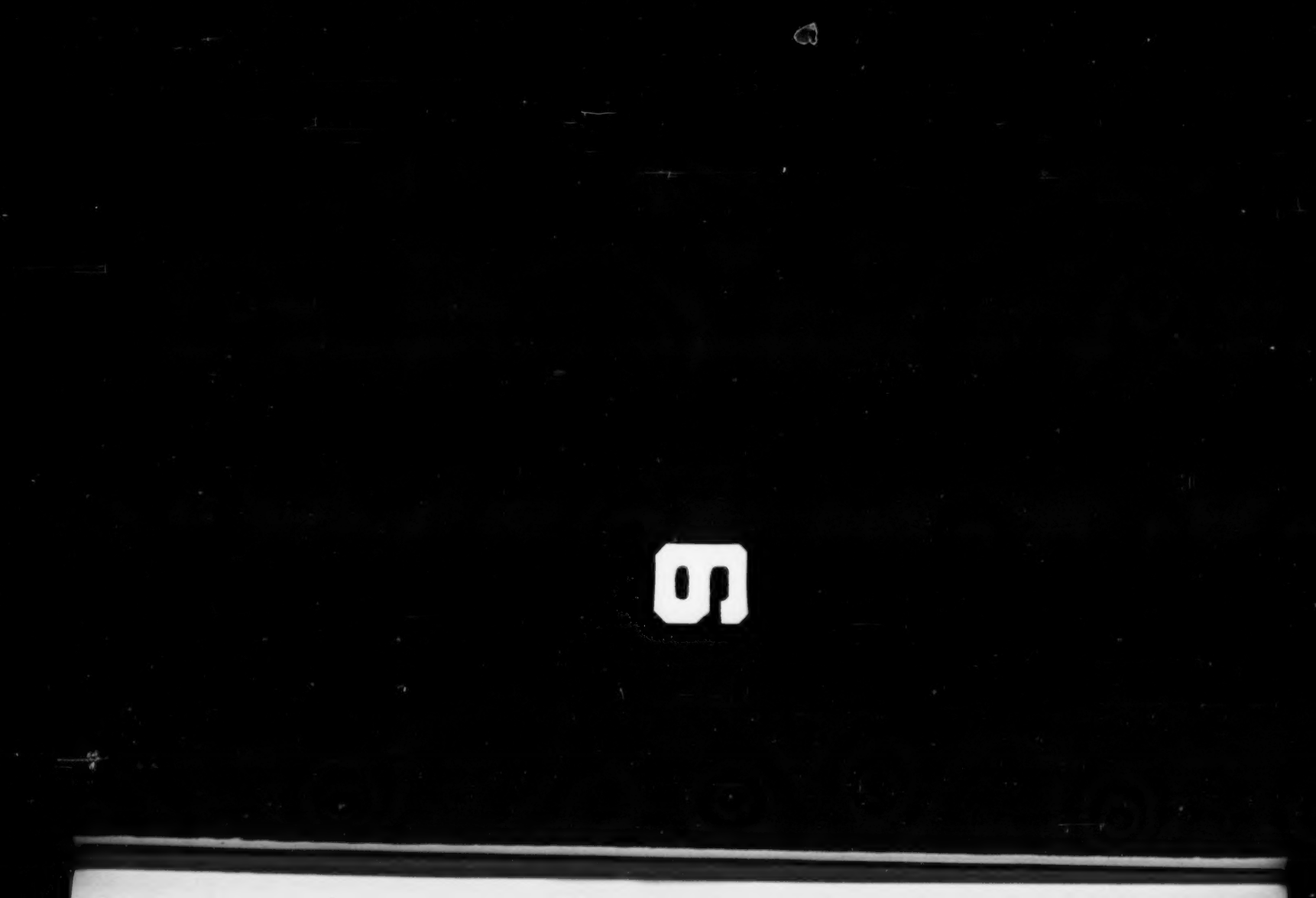
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